THE IRON AGE

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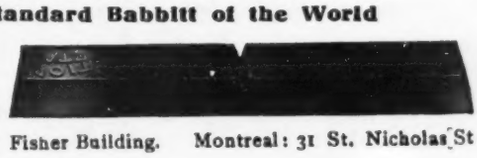

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THE IRON AGE

New York, Thursday, January 2, 1908.

The Grey Structural Mill at South Bethlehem.

Some Important Improvements Upon Its German Prototype.

The starting up this month of the Grey structural steel mill of the Bethlehem Steel Company, at South Bethlehem, Pa., is an event not without significance in connection with the widening of the field for steel as a material of construction. In previous issues of *The Iron Age** the characteristics of the Grey sections and some of the essential features of the method of rolling them have been touched upon. The present article gives a description and illustration of the Grey mill, as now completed, forming a part of the new Saucon plant at South Bethlehem, on which all together, including new blast furnace construction, ore handling equipment and additions to the original plant, an outlay of about $12,000,000 has been made.

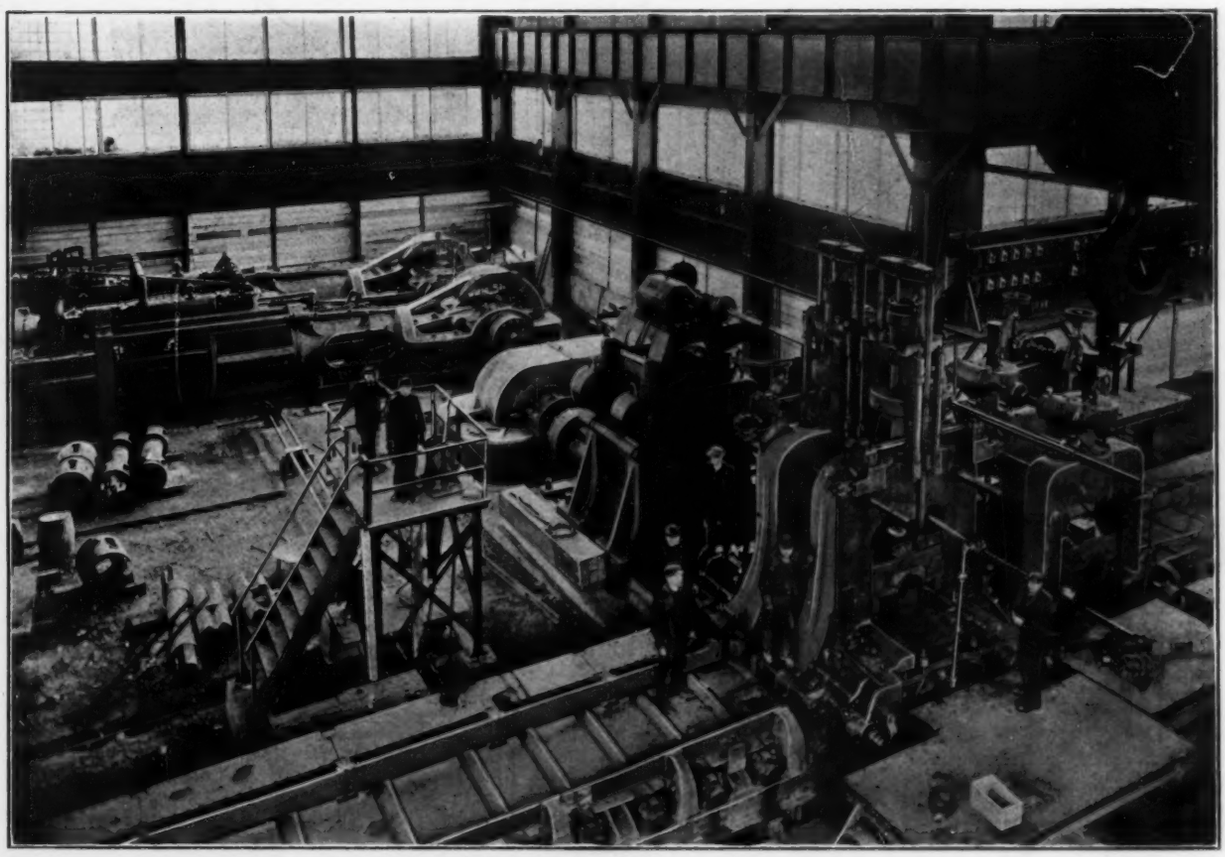


Fig. 1.—One of the Grey Structural Mills at the Bethlehem Steel Company's Saucon Plant, South Bethlehem, Pa.

An important departure is made at Bethlehem from the original Grey mill, installed at the Differdingen Iron & Steel Works, Differdingen, Germany. At Differdingen the beams are finished from the blooms by a single Grey mill, but at Bethlehem, by the use of two Grey mills of identical construction, the No. 1 as a roughing or intermediate mill and the No. 2 as a finishing mill, a considerably larger output will be secured. The Bethlehem mills, moreover, are larger than the one at Differdingen and embody a number of improvements. In Fig. 1 a view of one of the Grey mills at South Bethlehem is given and in Fig. 2 a plan view of the entire structural plant. This shows the relation of the blooming mill and the No. 1 and No. 2 Grey mills. Between the first or intermediate Grey mill and the second or finishing mill are about 300 ft. of mill table, this length being necessary when bars are simultaneously passing from each mill in the direction of the other. Fig. 3 is a plan of the blooming mill and Figs. 4 to 9 give details of the Grey mills and their method of rolling. In Figs. 4 and 5 the main horizontal rolls are marked M and the supplementary rolls S. Figs. 10 to 12 show the special hot beds and the run-out tables.

In the description given in our issue of September 26, 1907, it was explained that the rail mill and the Grey structural mill, which are arranged on parallel lines, headed by two groups of soaking pit furnaces and gas producers, had each its own blooming mill. The structural steel plant thus consists, first, of vertical pit furnaces, approach tables, a 46-in. blooming mill, with tables in front and back of the mill, each with a Wellman-Kennedy manipulator, similar to that already described in the rail mill article, and modified so as to handle satisfactorily the various sections required from the blooming mill. Then, in order from the rear blooming mill table are the front shear table, an 800-ton shear with hydraulic intensifier, a back shear table, and following these a No. 1 and a No. 2 Grey structural mill, with hot beds, straighteners and other accessories to which more detailed reference will be made below.

All the Grey sections are rolled direct from the ingot in one length. The method pursued in the production of the various sections is as follows: The ingot, which is always of open hearth steel, is delivered to the vertical pit furnaces from the ingot stripper. It is charged, withdrawn and placed in the traveling ingot seat by the

* *The Iron Age*, November 1, 1906, p. 1142; September 26, 1907, p. 831.

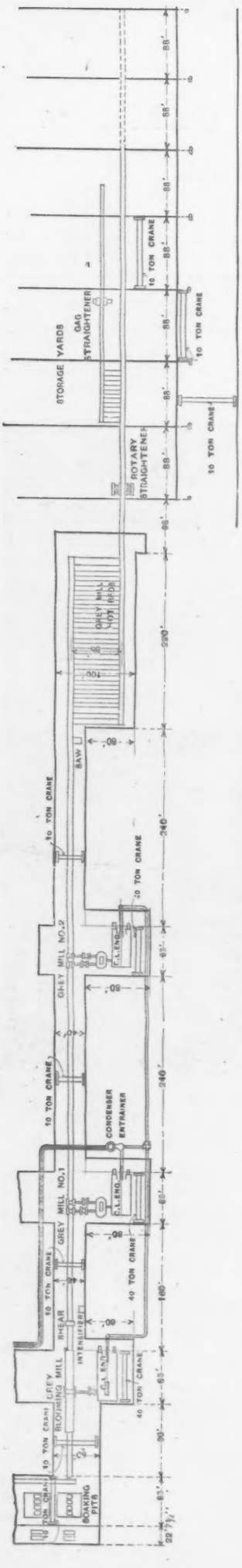


Fig. 2.—Plan View, Showing Arrangement of the Grey Structural Plant.

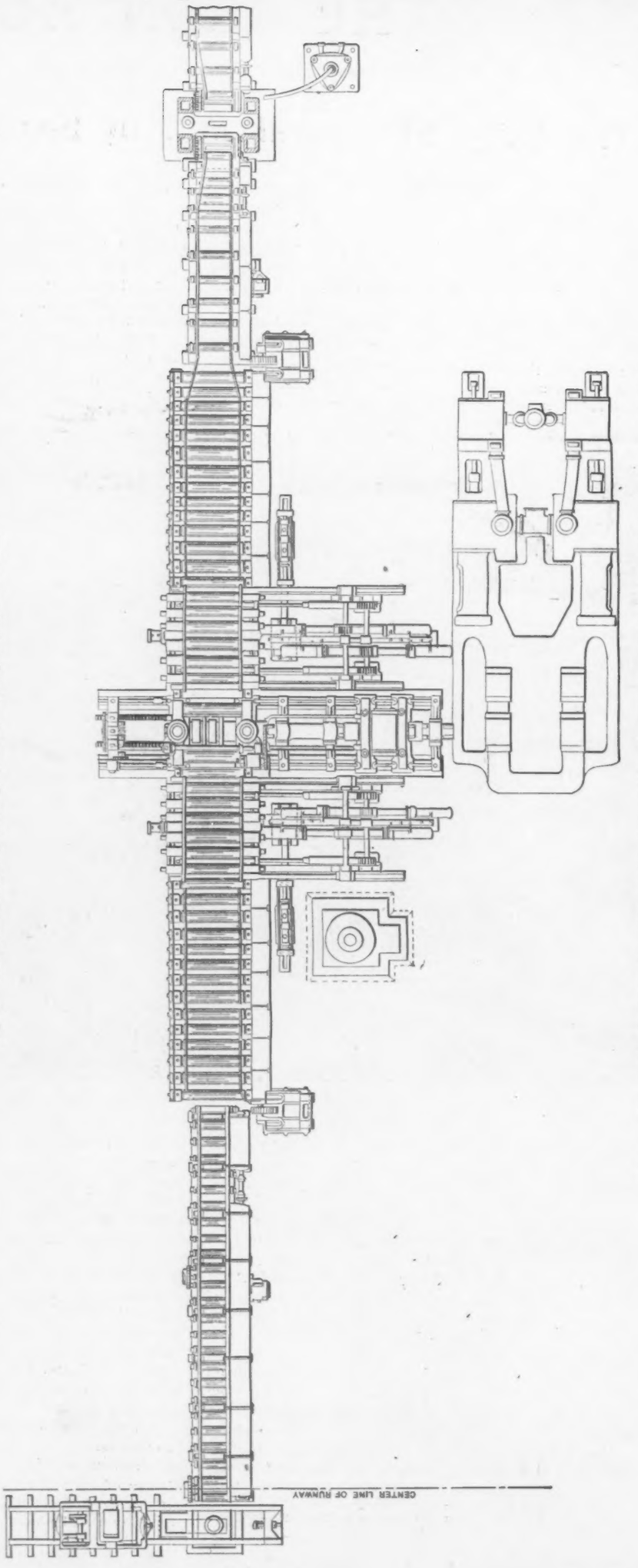
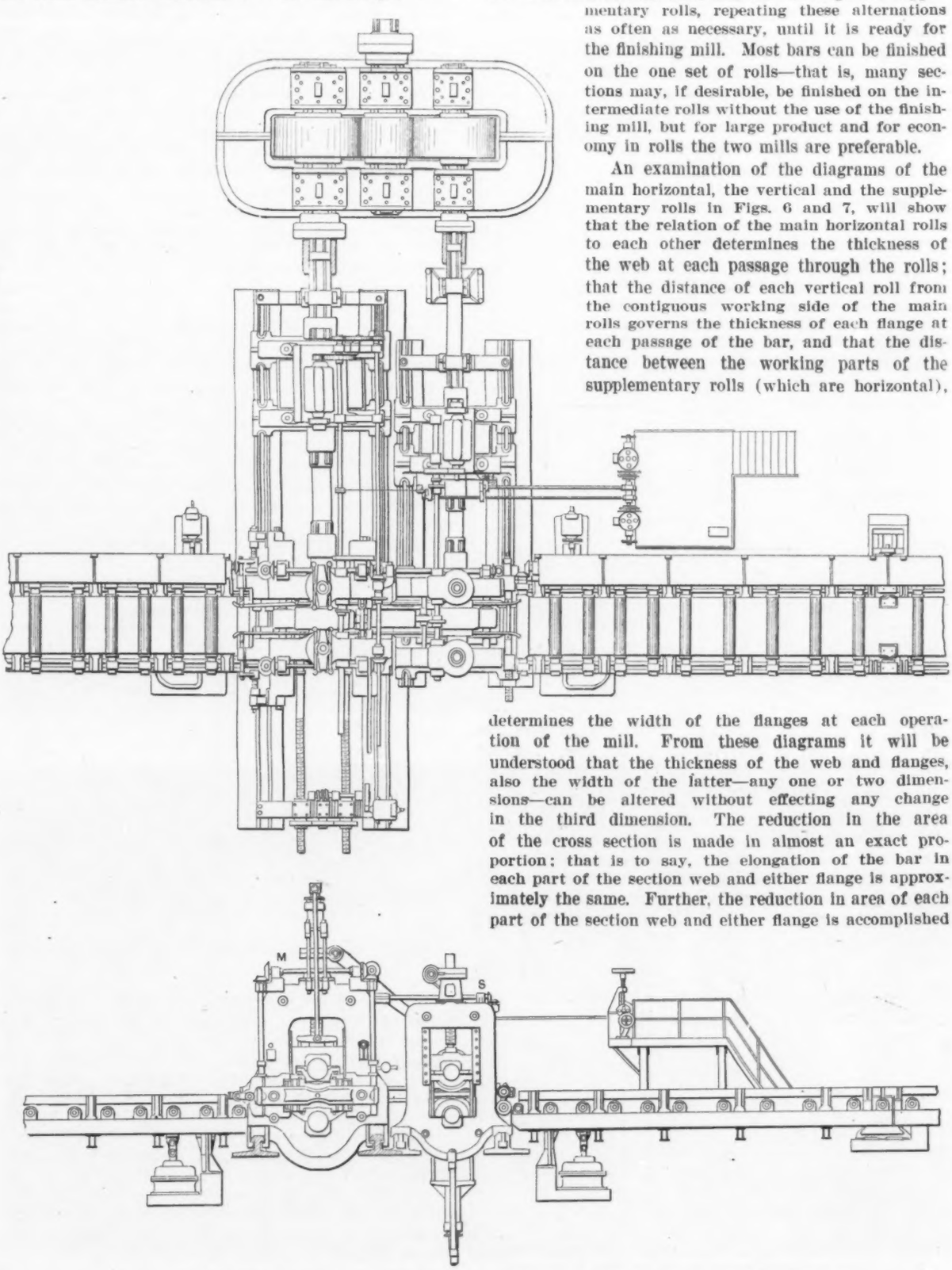


Fig. 3.—Plan of the Blooming Mill with Tables, from the Ingot Buggy Track on the Left to the Shear on the Right.

pit crane. The ingot seat is moved up to the approach table and tilted thereon by suitable mechanism. The ingot is carried up to the blooming mill on the roller tables, is squared up and then passed through the beam blank forming passes the number of times necessary to give the blank suitable thickness on web and flanges and a predetermined width of the latter. When rolled to the proper proportions the blank is passed on to the shear, in which the ends are cropped so as to secure a blank solid throughout its entire length. The thickness of the web and flanges of the blank should bear the same proportion to each other as will the web and flanges of the desired finished section. The blank is passed on to the first or intermediate Grey mill, where it is gradually reduced in cross section. It should be understood that the beam plank passes first through the supplementary rolls of the intermediate mill; that it continues on through the main and vertical rolls; that it returns on its backward passage (after the adjustment of all rolls) first through the main and vertical rolls and then through the supplementary rolls, repeating these alternations as often as necessary, until it is ready for the finishing mill. Most bars can be finished on the one set of rolls—that is, many sections may, if desirable, be finished on the intermediate rolls without the use of the finishing mill, but for large product and for economy in rolls the two mills are preferable.



Figs. 4 and 5.—Plan and Elevation of Grey Mill, Showing Main (M) and Supplementary (S) Rolls.

An examination of the diagrams of the main horizontal, the vertical and the supplementary rolls in Figs. 6 and 7, will show that the relation of the main horizontal rolls to each other determines the thickness of the web at each passage through the rolls; that the distance of each vertical roll from the contiguous working side of the main rolls governs the thickness of each flange at each passage of the bar, and that the distance between the working parts of the supplementary rolls (which are horizontal), determines the width of the flanges at each operation of the mill. From these diagrams it will be understood that the thickness of the web and flanges, also the width of the latter—any one or two dimensions—can be altered without effecting any change in the third dimension. The reduction in the area of the cross section is made in almost an exact proportion; that is to say, the elongation of the bar in each part of the section web and either flange is approximately the same. Further, the reduction in area of each part of the section web and either flange is accomplished for the most part in the same direction; that is, each is proportionately reduced in thickness at each passage through the rolls. Hence it is argued by the designers, as like causes produce like effects, the ultimate strength of the flanges and that of the web will be found more nearly approaching one another than similar parts do on beams rolled by the old collar and groove process. While the number of passes on either the intermediate or fin-

ishing Grey mill will be determined by the nature of the section it is desired to roll, the whole number of passes will be between 10 and 14. In most cases of beam and girder sections from three to five passes will be made upon the finishing mill, while for column sections of the heavier weights but one pass will be made in the finishing mill. The rolling surfaces are also shown in Figs. 6 and 7, and are marked *x*.

The two mills have a number of interesting minor features, some of which are clearly shown in the illustrations, including special side guards, top and bottom

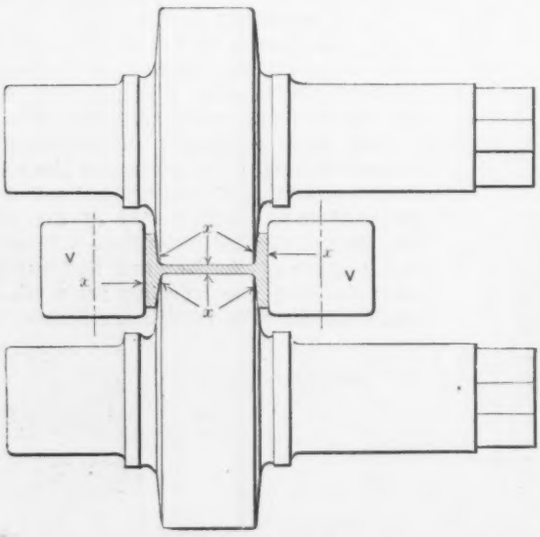


Fig. 6.—Diagram of Main and Vertical Rolls.—Rolling Surfaces Are Indicated by *x*.

guides, screw mechanism for horizontal and side rolls, indicators, &c., in addition to special scrap handling devices.

Between the No. 2 mill and the hot saw there is about 240 ft. of table, as there will be times when bars 200 ft. in length will be delivered to the hot saw. Leaving the saw the bars run out on the ingoing hot bed table, which as well as the outgoing table is about 250 ft. in length, to such a point as may be desirable. The beams are pushed off the ingoing table into such a position on

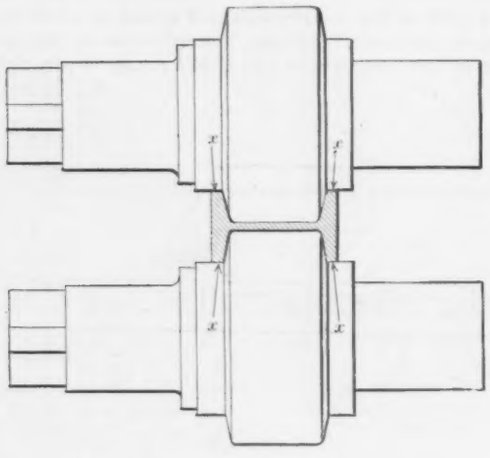


Fig. 7.—Diagram of Supplementary Rolls.—Rolling Surfaces Indicated by *x*.—No Rolling Action on the Web of the Beam.

the hot bed as to be within the radius of the mechanism used for turning them from a horizontal to a vertical position. They are then moved toward the outgoing table and when cold are deposited on it by the rake off mechanism. The hot beds, Figs. 10 and 11, are a radical departure from anything at present used in this country. The rails are of cast iron and are water cooled with the discharge water from the various hydraulic appliances at the saws and hot beds. These beds are built heavy to resist as far as possible the tendency to buckle which would be very great, as many of the sections rolled on these mills are much heavier than anything heretofore made. The section modulus of the heaviest beam now rolled is 198.4, while the section modulus of the heaviest beam at present designed for the Bethleham plant is 610.3. Thus the carrying capacity of the heaviest beam to be rolled at these works is more than three times that of the largest rolled beam at present made in this country.

Between the outgoing hot bed table and the rotary straightener is placed suitable mechanism for turning the beams on the edges of their flanges, so that they may be in a suitable position to enter and be operated on by the rotary straightener. Only the narrow flanged beams need be edge straightened by the rotary machine. When the mill is working on girder or column sections the machine will be withdrawn from its position and a section of table will be introduced so as to make a continuous passage from the outgoing table of the hot bed to the yard tables. The bars will be delivered on the yard tables. Such as need to go to the gag straightener will be carried on the transfer mechanism to the line of feed rollers working in unison with the machine in which they will be straightened. The material will be distributed, some to the cars for direct shipment and some to the stock piles. That which is to go through the fabrication department will be delivered to the south longitudinal runway; that which is to become part of an assorted order and such beams as merely have to be coped or cut to length on the cold saws will be delivered to the north longitudinal runway and shipped from there.

It will be appreciated that roll turning is reduced to

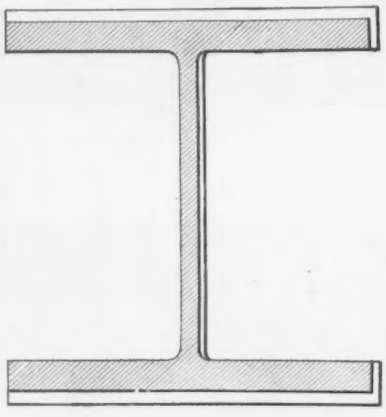


Fig. 8.—Method of Increasing Area of Column Sections.

a minimum by the Grey mill. The finishing rolls when worn out for a certain size can be either turned off so as to make the next smaller profile or a pair of rolls designed and used to roll special beams may be altered for girder sections; or either may be used, if put into the roll lathe, for a section of column steel. The adaptability and pliability of this type of mill is great, and the designers believe that time will show that for economy and scope it is a desirable addition to the manufacture of shapes and of much value to the architect and engineer. The Bethlehem mills are built for an output of 800 to 1000 tons a day, according to the section produced.

As illustrating the scope of the Grey mill, the interior columns of an actual 14-story building with basement may be taken as an example. All the columns for this building can be rolled on one set of rolls and without any change on main horizontal rolls of the Grey mills, or any change on the blooming mill, although the loads on a single column vary from 345 tons in the basement to 32 tons on the fourteenth story. If the beam and girder sections designed for the Bethlehem Steel Company are increased in weight in the same manner as are the column sections, that is, if the thickness of the flanges is increased proportionately to the increased thickness of the web, and the width of flanges increased

to the same extent as is the thickness of the web, then the increase in the section modulus will be in the same or nearly the same proportion as the increase in weight. Of course, such sections would be special, but the example is given to show the scope of the mill and its flexibility in supplying the wants of the engineer. Such sections with the increased weight added in the manner described could be furnished without the delay and cost attendant upon providing special rolls, as in the ordinary structural mill.

The complete layout and all the various appliances used in connection with the new plant were designed and specified for by the consulting engineers, Henry Grey & Son, 68 William street, New York, who are the patentees of the Grey mill. The vertical furnaces were built by S. R. Smythe & Co., Pittsburgh, and the cranes serving them by the Alliance Machine Company, Alliance, Ohio. The engines used for driving the blooming mill were built by the Wm. Tod Company, Youngstown, Ohio. They are of the twin compound condensing, geared reversing type, 40 x 66 x 54 in., geared 61 to 101. The gears are cut and have 40-in. face. The engines for the Grey mills are of the same size and design as the above, but differ in that they are direct connected to the mechanism for simultaneously driving the main and supplementary mills. The condensing plant was built by the Alberger Condenser Company, New York, and is designed to handle the exhaust from the three engines mentioned. The condenser is of the largest type the above company has turned out. It is supplied with necessary circulating water by one

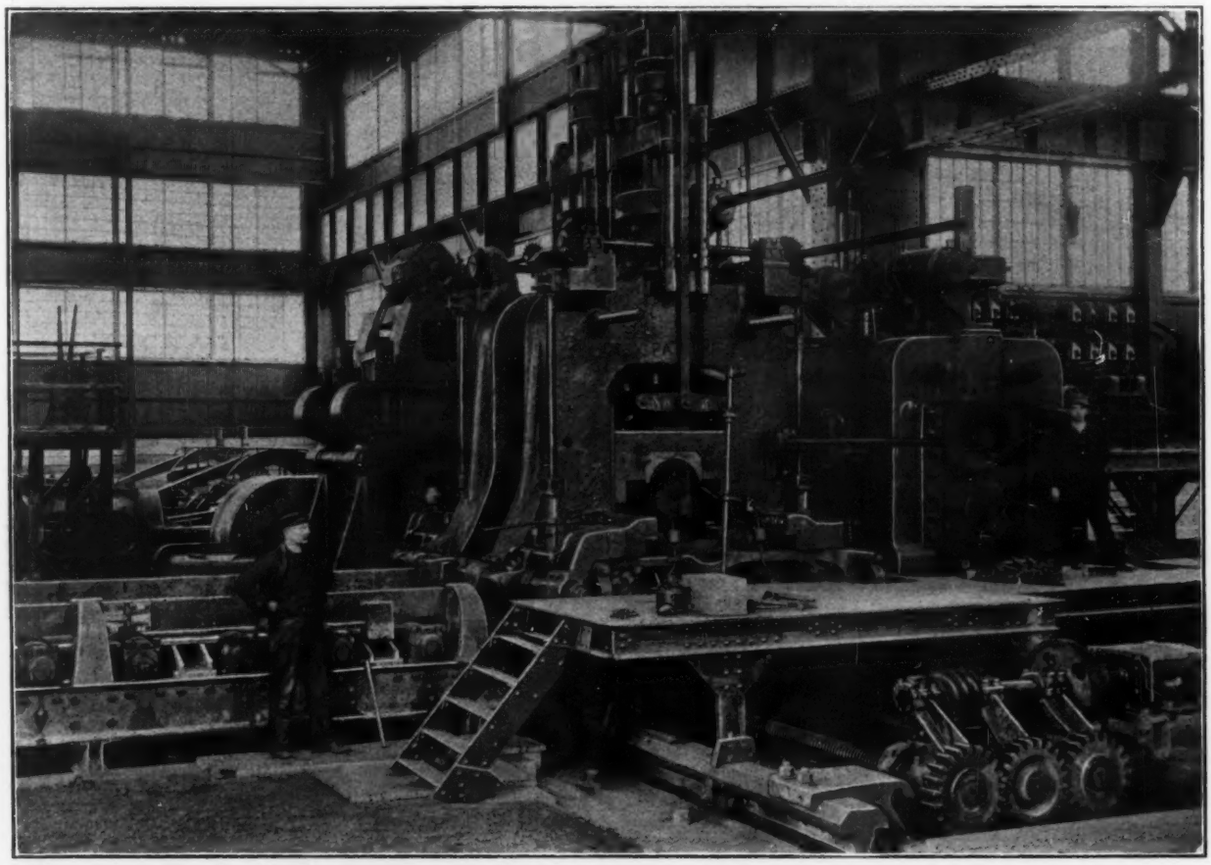


Fig. 9.—Side View of Grey Mill.

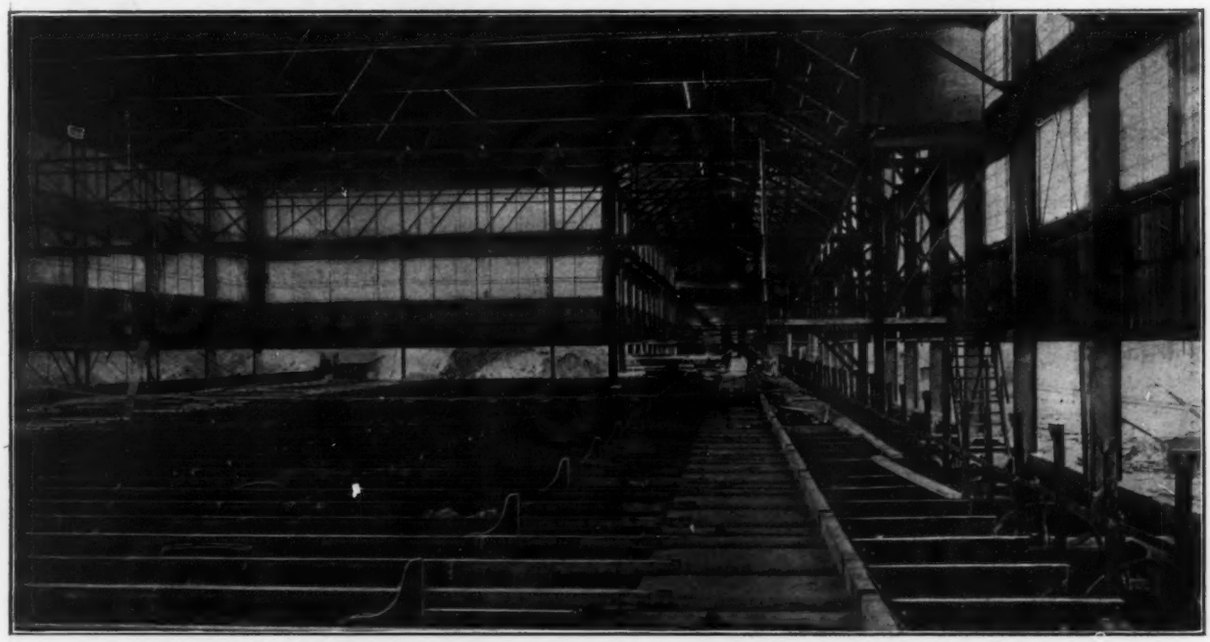


Fig. 10.—Hot Beds, with Cast Iron Water-Cooled Rails.—No. 2 Grey Mill in the Distance.

Fig. 11.—Another View of the Hot Beds.

20-in. two-stage water pump, assisted by one 20-in. return water turbine, the return water being supplied by the hot well of the condenser. The two-stage pump is driven by a 350-hp. cross compound vertical engine, which works normally at 225 hp.

All the feed tables and hot beds were built by the Wheeling Mold & Foundry Company, with the exception of the blooming mill tables and manipulators, which were furnished by the Mesta Machine Company, Pittsburgh. These latter tables are driven by Crane engines

Fig. 12.—Runout Tables Which Carry Beams from the Hot Beds to the Straighteners and Shipping Yards.

controlled by the Ahlen mechanism. All other mill tables are driven by Crocker-Wheeler mill type motors, which are manipulated by the magnetic controllers of the Electric Controller & Supply Company, Cleveland, Ohio. The same types of motors and controllers are used on all the screw-down mechanism on the blooming, intermediate and finishing mills. The 800-ton shear and hydraulic intensifier were built by the Mesta Machine Company, Pittsburgh. All hydraulic valves are of the Henry Aiken type. The blooming mill, both the intermediate and finishing mills, the gag straightener and the indicators for the several mills, all were built by the Bethlehem Steel Company. The rotary straightener was furnished by the United Engineering & Foundry Company, Pittsburgh, and the yard tables and transfer by the Wheeling Mold & Foundry Company. These tables are driven by constant speed motors and are reversed and handled by a patented induction drive, supplied by the last mentioned company.

A Record Car and Locomotive Output.

The figures compiled by the *Railroad Gazette* show a record breaking output for the car and locomotive works of the country in 1907. As might be expected, the number of orders on the books late in December, both for cars and locomotives, showed a very great falling off from the figures at the same time in 1906. Many car and locomotive works are running now on orders placed last spring with no new work in prospect. One of the large locomotive building companies reported a falling off of 75 per cent. in orders, as compared with last year. The Canadian car and locomotive builders have not felt the effect of the disturbance in financial and business conditions to any extent. All of the companies in Canada report as many or more unfilled orders on their books now as they reported last year.

Official returns from 36 car building companies in the United States and Canada (estimating two small plants not heard from) give the total number of railroad cars built during 1907 as 284,645, an increase of 19 per cent. over the record breaking output of 1906. This includes subway and elevated cars, but does not include electric street and interurban cars. No estimate has been made of the number of cars, both freight and passenger, built by the railroads in their own shops. Of the total number of cars built by manufacturers, 284,188 were for freight service and 5457 for passenger service; 280,216 were for domestic use and 9429 for export. The number of passenger cars built during the years shows an increase of more than 70 per cent. over last year's output. About 72 per cent. of the freight cars built were of steel or steel underframe construction. Canada built 9159 freight cars and 106 passenger cars, an increase of 30 per cent. over last year's output; all of these cars were for domestic use. The one company building cars in Mexico retired from business in the year and no returns were received from it. The following is the *Railroad Gazette's* compilation of the number of cars built in the last nine years:

Year.	Freight.	Passenger.	Total.
1899	119,886	1,305	121,191
1900	115,631	1,636	117,267
1901	136,950	2,055	139,005
1902	162,599	1,948	164,547
1903	153,195	2,007	155,202
1904	60,806	2,144	62,950
1905	165,455	2,551	*168,006
1906	240,503	3,167	*243,670
1907	284,188	5,457	*289,645

* Includes Canadian output.

The locomotive output shows a smaller increase over 1906 than the car building output. This is probably due to the fact that the locomotive builders worked their plants practically to their full capacity in 1906. The 12 builders in the United States and Canada built 7362 locomotives in 1907, of which 6564 were for domestic use and 798 for export. This is an increase of 6 per cent. in the total output; the export output increased 11 per cent. as against 5 per cent. for domestic output. These figures do not include locomotives built in railroad shops or locomotives rebuilt or repaired. There were 330 electric locomotives and 240 compound locomotives built, as against 237 and 292 respectively in 1906. The Canadian output of locomotives was 264. The following table shows the number of locomotives built in the last 15 years:

Year.	No. built.	Year.	No. built.
1893	2,011	1901	3,384
1894	695	1902	4,070
1895	1,101	1903	5,152
1896	1,175	1904	3,441
1897	1,251	1905	*5,491
1898	1,251	1906	*6,952
1899	2,475	1907	*7,362
1900	3,153		

* Includes Canadian output.

The cost of cars and locomotives has increased slightly over 1906, due largely, in the case of locomotives, to the increased average weight. Estimating the average cost of freight cars at $1100, the total spent for freight cars amounts to $312,607,000; for passenger cars at $8500 the cost was $46,384,000, and for locomotives at $16,000 the cost was $117,792,000. The total amount spent by the railroads for new rolling stock and locomotive power approximates $477,000,000 for 1907, an increase of about 25 per cent. over 1906.

The American Furnace & Machine Company.

During 1907 the American Furnace & Machine Company, Diamond Bank Building, Pittsburgh, did some very successful work in the furnace line. It recently built a new 40-ton open hearth furnace for the United Steel Company, Canton, Ohio. It has also designed some new and modern sheet and pair furnaces and producer gas fired annealing furnaces, erecting five sheet and pair furnaces and three producer gas fired sheet annealing furnaces, and also two of the James H. Swindell patent water seal gas producers at the plant of the Seneca Iron & Steel Company, Blasdell, N. Y. These furnaces are so arranged as to give a soft and uniform heat throughout and are easily operated. The sheet and annealing furnaces are equipped with frictionless charging machines.

Three 12 ft. x 12 ft. James H. Swindell patent water seal gas producers were recently installed in the plant of the Jessop Steel Company, Washington, Pa., to operate three 36-pot crucible furnaces, built by the American Furnace & Machine Company some time ago. These producers are also of a new design and are said to be giving entire satisfaction in every respect. The company has a large number under construction at the present time.

The same company builds four types of gas producers, including small gas producers 10 ft. in diameter by 12 ft. high, fed by one bell coal hopper, and a large gas producer 12 ft. in diameter by 12 ft. high, fed by two bell coal hoppers. These producers are operated by poke holes located on top, and there are no side poke holes, doors or false bars to contend with. These bell coal hoppers are so arranged as to spread the coal evenly around the producer. A third type of gas producer is known as the suction producer and is used for gas engine and illuminating purposes. The gas from this producer is pure and strong and free from dust and carbon, and does not cut valves or clog pipes. A fourth type, which will be found adapted to many purposes, is mechanically poked and mechanically fed.

The above company has just completed a new design of copper smelting and refining furnace for the Algoma Custom Copper Smelting & Refining Company, Thessalon, Ont. This furnace will be in operation about April 1, 1908, and is of different construction from any smelting furnace now in use. It is said to be constructed so as to obtain all the copper in the ore, without allowing any to escape through the stack. There is no direct connection to the stack, the melting chamber being separate from the draft of the stack, and all metal contained in the ores will be extracted and melted down into the receiving bosh, where it can be either dipped out by ladles or tapped through a spout into a ladle, as desired. This is a 200-ton furnace operated by two James H. Swindell patent water seal gas producers.

The Goulds Manufacturing Company's New Foundry.

An Extensive Plant for the Production of Pump Castings.

The Goulds Mfg. Company, Seneca Falls, N. Y., has recently occupied a group of new buildings, consisting of a large foundry and pattern shop, with accessory power plant. Their erection was in progress for nearly 18 months, the new buildings being part of a comprehensive plan of construction that was undertaken six years ago and that will require several years for complete rounding out. At the outset the problem presented was that of a long established company that had outgrown the facilities afforded at its original site. Addition after addition had been made, but the old works were hedged in by the Seneca River and the Seneca and Cayuga Canal and the growing up of the town about them. Several buildings had been erected, indeed, extending over both the canal and river, to such unusual measures was the company driven by the demand for increased facilities. Originally confined to small pumps, the business had developed rapidly in the manufacture of power pumps, which was entered upon in the late eighties. Therefore the natural first step, when another site became a necessity, was to provide in the new place sufficient foundry and machine shop capacity to take care of the heavy work. This was done in 1900, when the company acquired 10 acres of land in the western part of the city, about a mile from the original plant. A foundry and machine shop were built first, and thereafter the No. 1 plant and the No. 2 plant were distinguished in all the operating records, "No. 1 work" designating the smaller pumps and "No. 2 work" the large power pumps.

The present article deals with the extensive new foundry and pattern shops that were under construction in 1906 and 1907, Joseph H. Wallace & Co., industrial engineers, New York, being the architects. These buildings came in response to constant expansion in both the large and small pump departments since the first erection on the new site. They will be followed by others in pursuance of a plan under which the foundry will be on one side of and at right angles to a series of machine shops, shown in broken lines in Fig. 1. At the other side of the proposed machine shops and heading all of them will be an assembling department. This last named building will receive work from all the shops, and in it and alongside of it will run tracks for shipping out the finished product. The entire layout of the No. 2 plant has a frontage of 2100 ft. on the New York Central Railroad, and the rectangle marked out by the final group of buildings will be 931 ft. from north to south, as in Fig. 1. Additional property has been acquired since the first purchase in 1900, so that the company now has 66 acres at the new site.

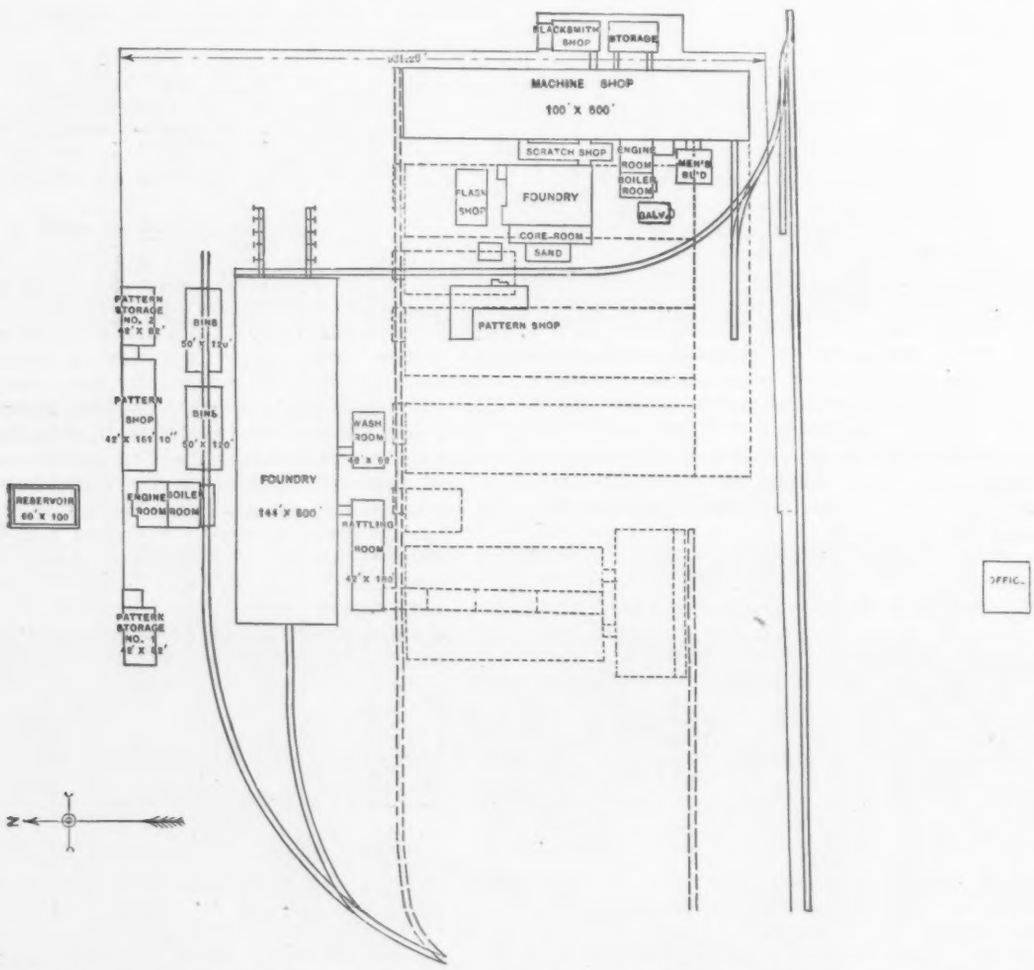


Fig. 1.—Plan of the No. 2 Plant of the Goulds Mfg. Company, the New Buildings Being the Group at the Left.

The Original No. 2 Plant.

Before giving a description of the new plant, which is the group of buildings in the left-hand portion of the sketch in Fig. 1, reference should be made to the machine shop shown on the upper side of the plan drawing. This building, erected in 1900, is 500 x 100 ft., and is equipped throughout with modern tools and labor saving devices, including three 10-ton electric cranes, with runways the entire length of the building. Just east of the machine shop are the blacksmith shop and storeroom buildings. On the west side of the machine shop and south of the group of smaller buildings is the men's building, with complete system of plumbing and equipment of lockers, wash trays, &c., for the convenience of employees. The upper floor of this building is devoted exclusively to a large reading room, on the tables of

which are provided trade, technical and other publications. This room is used during the noon hour as a lunch and smoking room, and is in charge of a special janitor.

The engine and boiler room of the group of buildings west of the machine shop have been abandoned, the equipment being transferred to the new power house, of which mention will be made later. The foundry and cleaning buildings and those provided for cores, sand and flasks have been abandoned, and will be used to supplement the machine shop. The pattern storage building in the upper central portion of the sketch will continue to be used for the same purpose.

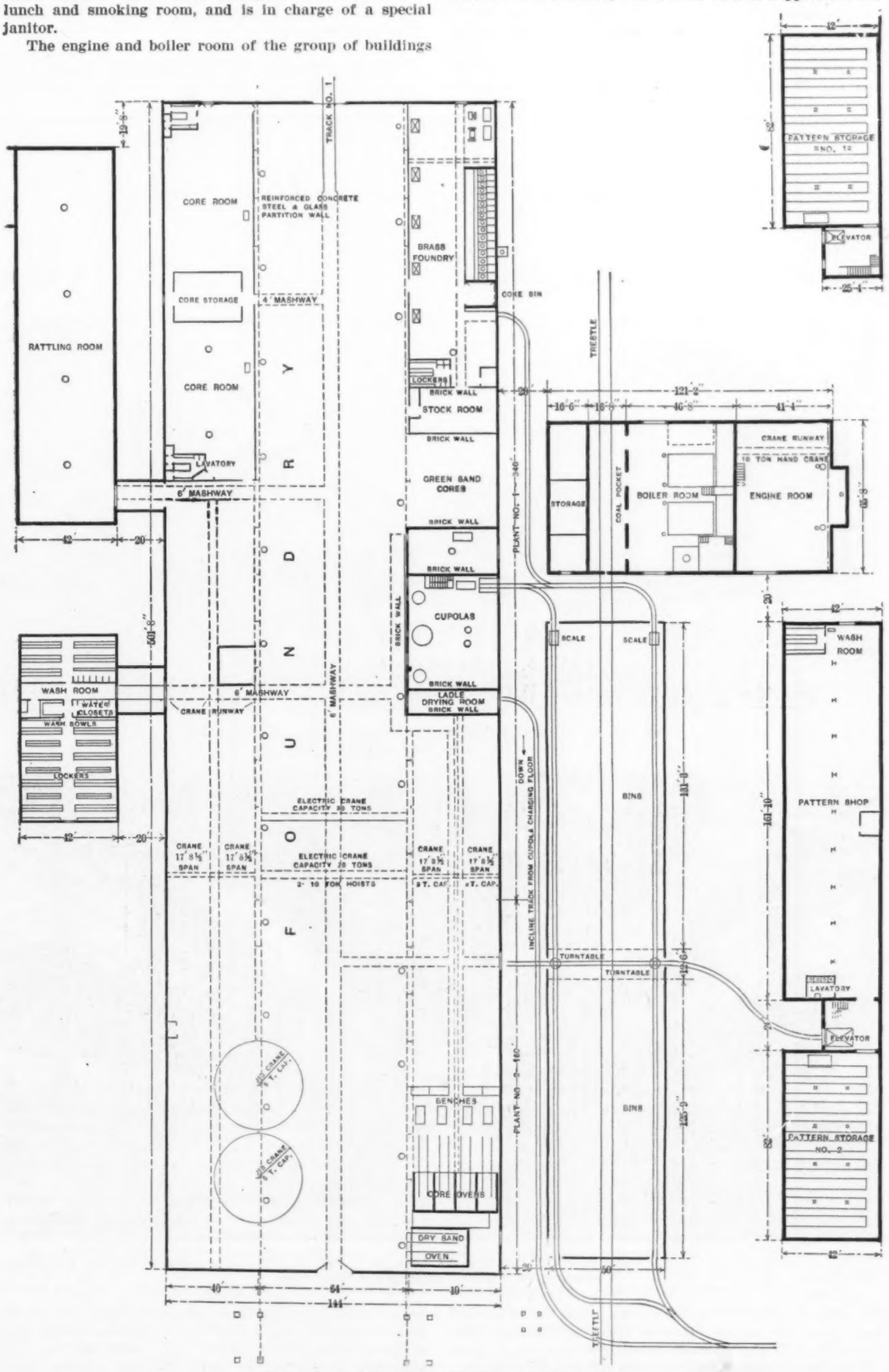


Fig. 2.—Plan of the New Foundry and Auxiliary Plant.

The New Plant.

The new foundry and the buildings connected with it are shown in plan in Fig. 2, which gives a good idea of their extent and equipment. The foundry is 500 x 144 ft., of steel and brick construction, with monitor roof. From the floor to the ridge is 66 ft. The monitor extends the full length of the building. There is a complete system of transom windows on both sides, these being opened and closed by devices operated from the foundry floor. Four series of skylights are provided—one on each slope of the main foundry roof and one on each bay, the former being 10 ft. 10 in. wide and the latter 15 ft. 6 in. The skylights are of ribbed glass and extend the full length of the building. The building is fireproof. The foundations are of concrete and the walls are brick. The roof and ends are of steel frame and reinforced concrete. The roof is waterproofed with five-ply roofing felt, laid in asphalt, with coating of stag. The flashing is of 14-oz. copper.

The new foundry building has a standard gauge switch track running into the main span. Another connection with the New York Central tracks is the trestle track shown, running over the coal storage end of the boiler room and thence over the storage bins at the right of the main building in Fig. 2. Another feature to which attention is particularly called is the inclined track shown in Fig. 3, leading from the cupola charging floor and supported by heavy brackets carried on the side of the storage bin building.

Fig. 4 gives an interior view of the foundry looking

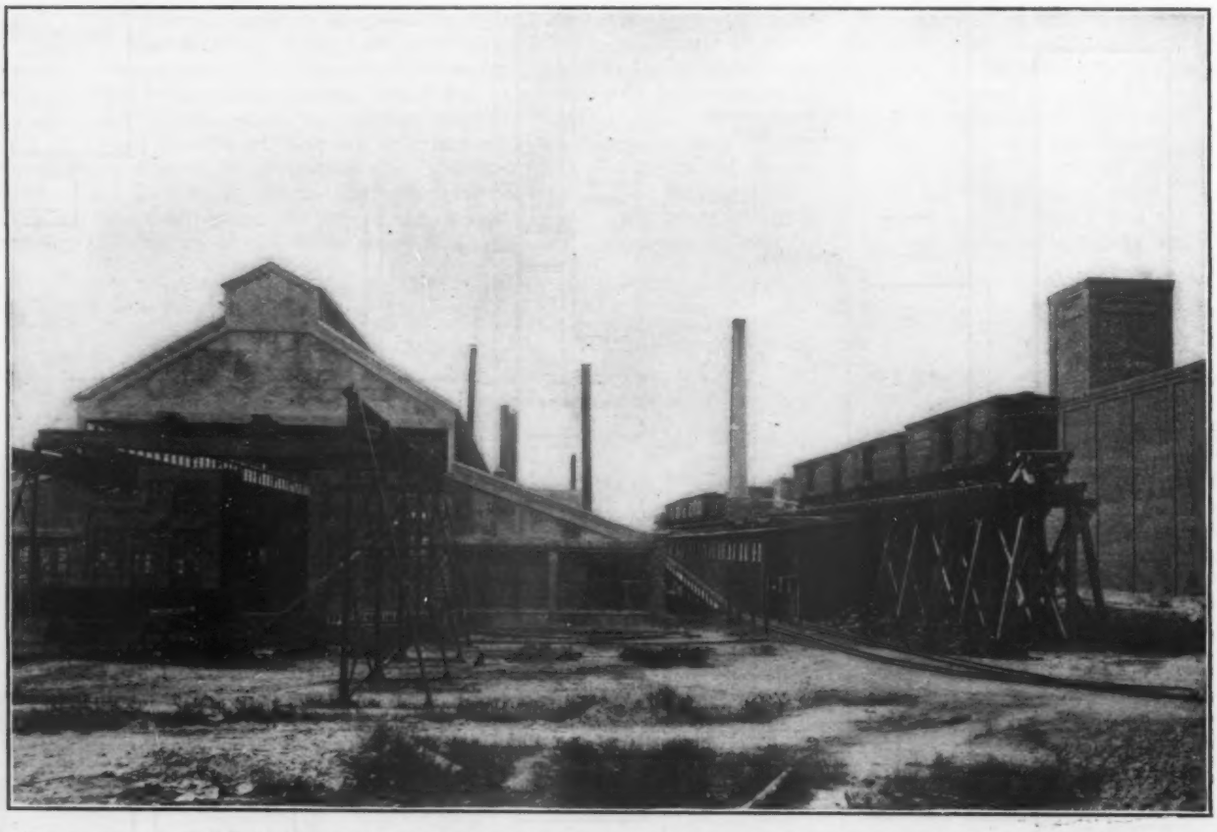


Fig. 3.—View at East End of the New Plant, Showing Foundry Crane Serving the Flask Yard, Also the Inclined Trackway and the Trestle Crossing the Roof of the Bin System.

Fig. 4.—Interior View of the Foundry.—"C" Indicates the Location of Cupolas. The Illustration Shows the Exceptional Provision for Lighting, Heating and Ventilation.

toward the west end. The location of the three cupolas is indicated by the letter C, in the central portion of the right hand side. The iron is distributed by track ladles through the various avenues which were not completed when this view was taken. For large castings the heavier ladles are transported by a 20-ton crane serving the center bay, which is 64 ft. wide. This crane is of the two trolley, five motor Alliance Machine Company type. The crane runway extends beyond the east end of the building, a distance of 100 ft., to serve the heavy flask storage, and to reach cars on the switch. The swing door in the end of the building, which opens to allow the passage of the crane to the outside, is operated by an electric hoist.

Two 5-ton electrically driven jib cranes, as shown in the plan in Fig. 2, and one of which is included in Fig. 4, are provided for handling large castings. They have 19 ft. arms and are arranged to swing entirely around the supporting columns. They were built by the Northern Engineering Works, Detroit, Mich.

Fig. 5 gives a view of the western end of the foundry floor, which is devoted to small pump work. The heating pipes are shown plainly in this view, as also in Fig. 4. The side bays of the main foundry are each served by two small cranes. Those in the north bay, which are Niles electric cranes of 3 tons capacity, can be utilized in handling large cores to and from the core oven cars running on the industrial track. Hoists operated by compressed air are provided in the south bay.

The cupola room is 60 by 40 ft., and contains at present a 92-in. cupola, built by Byram & Co., Detroit, Mich., and used especially for small castings; also a 72-in. cupola built by Byram & Co., which was transferred from the old foundry and serves for the heavier or triplex castings, and a 48-in. cupola built by the Northern Engineering Works, Detroit, used for special mixtures.

Loaded cars are taken to the charging floor on an hydraulic elevator. The empties are returned to the ground level at the east end of the storage bins by an inclined industrial trackway; thus all interference with the incoming loaded cars is avoided. On the second floor of the blower room is one of the two steam engine driven blowers which supply warm air for heating the foundry. The other blower which heats the south side of the foundry, the rattling and grinding building, shown on the left in Fig. 2, and the washroom and locker building, 82 x 42 ft., is located on the south side of the foundry building.

An Ingersoll-Sergeant 16¼ and 10¼ by 10-in. air compressor is located in a room adjoining the cupola room. From a large air receiver on the north side of the compressor room pipes run through the cupola room to the foundry to the molding machines and air hoists. A branch pipe goes to the pattern storage buildings, supplying the air valves of the sprinkler system. A line also runs to the No. 2 machine shop for supplying air hoists, chipping tools, &c., and to the cleaning room for sand blast.

Core Department.

The drying ovens for power pump work are located in the east end of the north bay of the foundry, as shown in Fig. 6. There are five of these, one being 16 x 24 ft. inside measurement for the dry sand molds, and the other four 9 x 16 ft., for drying the large cores. The rooms in which the smaller cores are made are located in the west end of the south bay, occupying a space 160 x 40 ft. This department is separated from the foundry by a steel and ribbed glass partition. In the small core rooms are seven tracks, on each of which runs a car. Each track runs into a separate oven. The car runs between the benches, and the coremakers have only to turn around from their benches and place the finished work directly on the shelves of the core cars. In addition to the ovens for the cars five Millet core ovens have been installed, which are used during the day and are arranged so as to use the same stacks as the main ovens. The large core oven doors are counterweighted and thus easily raised, the cables running over ball bearing sheave wheels. The furnaces heating these ovens are located at the rear. The fuel is not carried through the core room, but through a walled passageway at the rear, thus doing away with the handling of coke and ashes through the core room proper. Midway of the small core department is a room 20 by 28 ft., fitted with shelves for storing cores not required for immediate use.

Fig. 5.—View in the West End of the Foundry, Devoted to Small Pump Work.—The Cross Marks the Entrance to the Small Core Department.

The Brass Foundry.

The brass foundry, which occupies the northwest corner of the main foundry building, is 120 by 40 ft. It is

well equipped for the production of a variety of brass work ranging in weight up to 1500 lb. There is a bank of 16 melting pots. The brass foundry floor is served by two cranes of 2 tons capacity each. The equipment includes two tumblers, two sprue cutters and one grinder.

Rattling Room.

Connected with the main foundry by an enclosed passageway is the rattling room, 42 by 160 ft., one story high, with truss roof. Skylights 8 ft. wide are provided on each side of the roof, the entire length of the building. Twelve tumbling barrels, driven by Westinghouse motors, were supplied by the W. W. Sly Mfg. Company, Cleveland, Ohio. Nine direct connected grinders were furnished by the Bridgeport Safety Emery Wheel Company, Bridgeport, Conn. The exhaust ducts from the grinders are led under the floor, a Sterling exhaust fan being located on the north side of the room. It draws the dust and air into the dust separator just outside of the building, the air being discharged back into the room.

Pattern Storage Buildings.

The two buildings for the storage of patterns are located to the north of the foundry as shown in Fig. 2. Each is 82 x 42 ft., and they are designated as pattern storage No. 1 and pattern storage No. 2, the former being for small pump patterns and the latter for the patterns for triplex power pumps. The walls of these buildings are without windows, excepting on the north side, or the one remote from the other buildings. Pattern storage No. 2 is 65 ft. high, or four stories, and has a tower 92 ft. high, containing a 33,000 gal. tank. Each of the pattern storage buildings has a hydraulic elevator in an outside fireproof stairway tower. These elevators are operated from pressure tanks supplied by triplex power pumps of the Goulds make, which are driven by Crocker-Wheeler 250-volt motors. The pattern storage buildings are equipped with automatic sprinklers having dry pipe valves to control them during the winter months. The pattern making department is located in a two story building west of pattern storage No. 2, 162 ft. x 42 ft. The lathes, band saws, jig saws, surface planers and core box machines are duplicated toward opposite ends of the pattern shop, so that a workman does not have to go far to reach any kind of machine.

Storage Bins.

It will be seen by reference to Figs. 2 and 3 that the trestle, 22 ft. high, which runs across the coal pocket room, continues over the roof of the storage house, which has a total length of 268 ft. The roof of the storage department is for the most part a series of hatch coverings which are removed so that pig iron, sand, coke and other supplies may be dropped into their proper bins. Industrial tracks traverse the stock storage house on either side and a transverse track with turntables is laid in a middle passageway as shown in Fig. 2. The industrial railroad, which was furnished by the Arthur Koppel Company, reaches also to pattern storage building No. 2, and to the brass foundry. The industrial cars loaded with pig iron and coke are pushed by hand to the cupola room where an elevator carries them to the charging floor. As indicated above, the empty cars from the charging floor are pushed out upon an inclined industrial track leading to the yard at the east end of the bin storage house. On coming down into the yard the empty cars run up a slight incline from which they return by gravity to either side of the storage house, the switch being set as cars are needed.

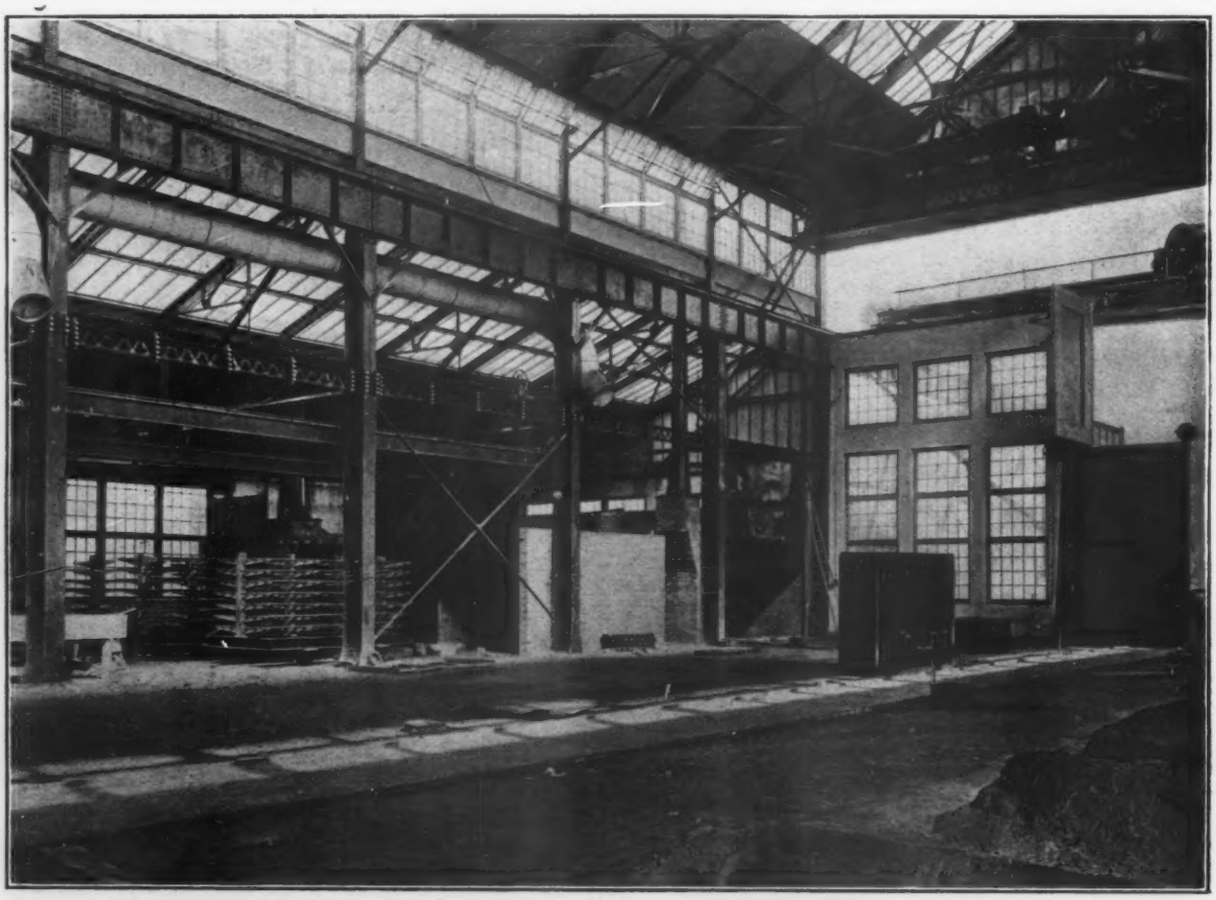


Fig. 6.—Northeast Corner of the Foundry, Showing Large Core Department, with Ovens and Racks.

Washrooms and Lockers.

Unusually complete provisions have been made for washrooms and lockers. The large washroom shown at the left in Fig. 2, is reached by an enclosed passageway from the main foundry. It contains 232 lockers, and the rows of washbowls alternate with the lockers. For the small coreroom, 32 lockers are provided, with separate lavatory. The pattern shop has 20 lockers, and the brass foundry 24 lockers. The main washroom is intended for coremakers as well as molders.

Heating System.

For the American Blower Company's heating system, already referred to, exhaust steam is carried through a 16-in. pipe leading from the power house, and the distribution is through 12, 10, 8 and 6 in. pipes to various por-

tions of the plant, including the No. 2 machine shop. There are two fan blowers in the foundry, one in the pattern shop and four in the machine shop. The steam pipe conduit carries the exhaust steam pipe for heating and also the live steam pipe supplying the engines driving the fan blowers and the pumps at the receivers. A third pipe in the conduit returns to the feed water heater in the power house the condensation from the three receivers. The three pipes are carried in a Portland sectional conduit, supplied by the H. W. Johns Manville Company. The steam and exhaust piping and Holly return system were installed by the Walworth Mfg. Company, Boston, Mass. The pipe conduit is about 900 ft. in length.

Water Supply.

A very complete system of pressure mains has been provided, having two underwriters' pumps at one end and a connection with the city water supply through an 8-in. pipe at the other end. In addition the company has a 6-in. line of its own extending from the pump house at the Seneca River 1700 ft. to a 450,000-gal. reservoir at the north of the power house. The reservoir is 60 x 100 ft. and 8 ft. deep. At the river is a Goulds' electrically driven 8 x 10 triplex pump, designed primarily to supply a 33,000-gal. tank in the tower of pattern storage No. 2. There is a by-pass in the pipe located near the power house, so that the river supply can be turned into the reservoir referred to above. The lower half of the tower tank supplies the sprinkler system in case the city pressure becomes lower than the tank pressure. Only the upper half of the tank supply can be used for industrial purposes, including the supply to wetting down tanks in the foundry, testing water, washroom supply, &c. The electric pump at the river is controlled by a float switch at the tank. For drinking purposes the city water is used, supplied through a 2-in. pipe. The drinking water will pass through a filter, to be installed in the basement of the engine room.

In the basement of the power house are two underwriters' fire pumps, one of 1000 gal. and the other of 750 gal. capacity per minute. These pumps take suction from the reservoir, and their discharge pipes are connected with the complete system of the pressure mains running to 15 hydrants distributed about the plant. A 5-in. connection is made to the city service for use in the boiler room and for drinking. A gate and check valve are provided in this line, and in case the river supply is interfered with the city supply from the 5-in. pipe can be turned into the 6-in. pipe leading to the pattern storage tower tank and supplying river water for various purposes about the plant.

Power Plant.

The power house, Fig. 8, which includes engine room, boiler room and coal storage space, is 128 by 66 ft., and room has been left for an addition to the west. Two engines are at present installed, the larger being a 24 x 36 in. Allis-Chalmers heavy duty engine direct connected to a 300 kw. Westinghouse three wire direct current generator of 250 volts, running at 120 rev. per min. The smaller engine is 14 x 42 in., of similar type. It is belted to a 150 kw. Westinghouse generator. Space is provided for a duplicate of the larger unit. The engine room is served by a 10-ton Maris crane. The switchboard is located in a bay 24 x 6 ft., on the north side of the engine room. The boiler room contains four 150 hp. Babcock & Wilcox boilers, carrying 125 lb. steam pressure. The chimney is built of radial brick and is 5 ft. inside diameter and 125 ft. high. It is lined for 72 ft. The builder is the W. M. Kellogg Company. A Cochrane feed water heater and a Gould 4 x 6 triplex boiler feed pump driven by a variable speed motor, are installed in the boiler room. The boilers can also be fed by an injector. The south side of the boiler room is devoted to coal pockets, the coal being dumped from cars running on a trestle built over the roof of the pockets. Large storage rooms are provided adjoining the coal pockets, entrance to these being from the outside. A room 15 x 22 ft. is given up to pig copper and other brass foundry stock. There is a similar room for the iron

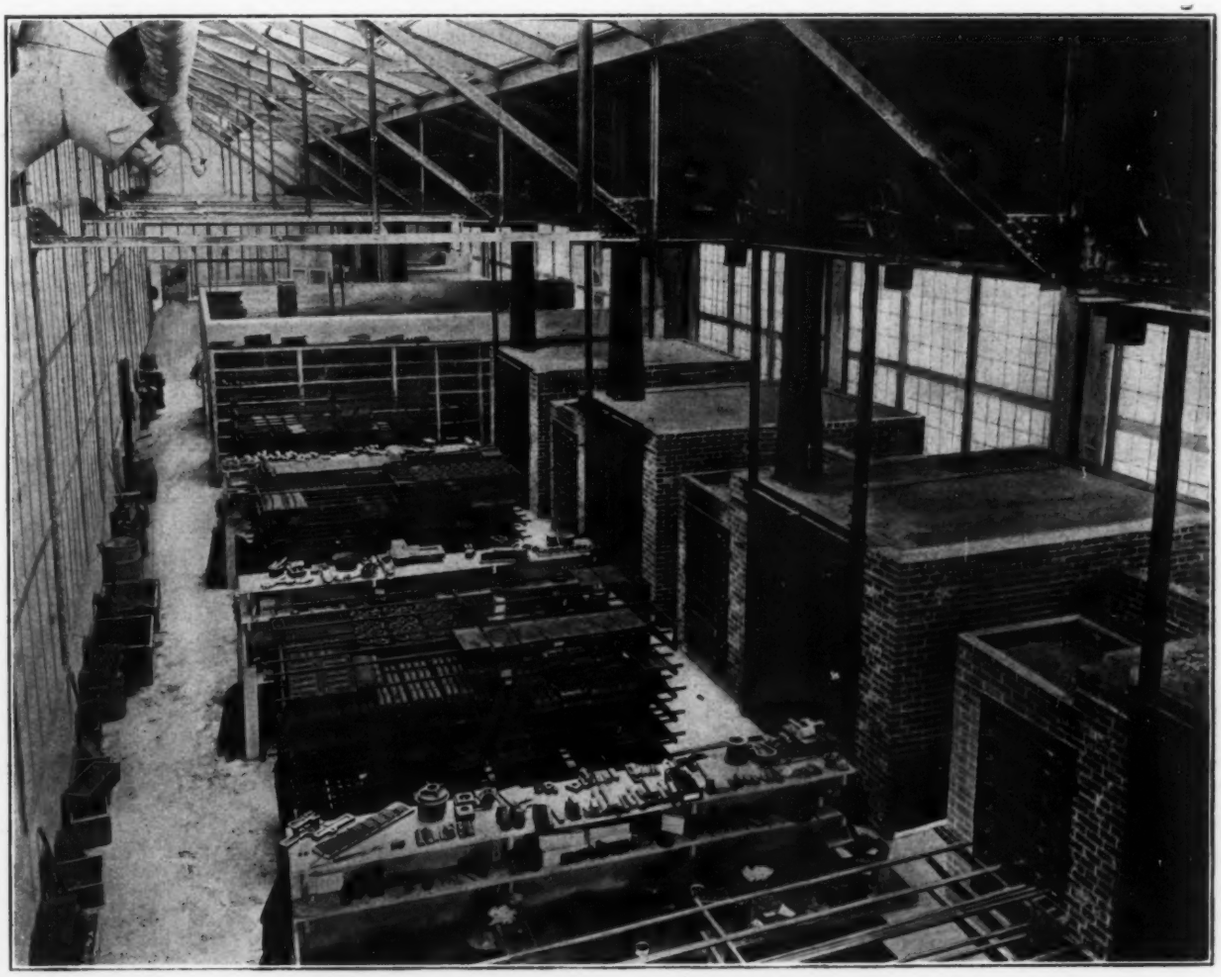


Fig. 7.—Small Core Department, with Ovens and Racks.

foundry and a third room, 15 x 15 ft., contains oils and powerhouse supplies.

The Offices.

The erection of a new office building was one of the important features of the Goulds Mfg. Company's construction programme of the past year. It is located on a separate plot of ground, as shown in Fig. 1, at a convenient distance from the works, and faces the western extension of the main street of the town. The building is of brick with stone trimmings, is 72 ft. square, with two stories and a basement, and is attractive both as to exterior and interior. In general, the plan carried out was to put the offices of heads of departments and officers of the company on the sides, having in the center the main office, lighted from the roof. The fireproof vault, measuring 16 x 20 ft. inside, which is in the center of the building, extends from the basement through to the roof. Each floor has an entrance to the vault, doing away with the usual carrying of records from one floor to another for purposes of safekeeping. On the first floor, in addition to the rooms of various officers of the company, are the cost, bookkeeping, credit, purchasing and foreign de-

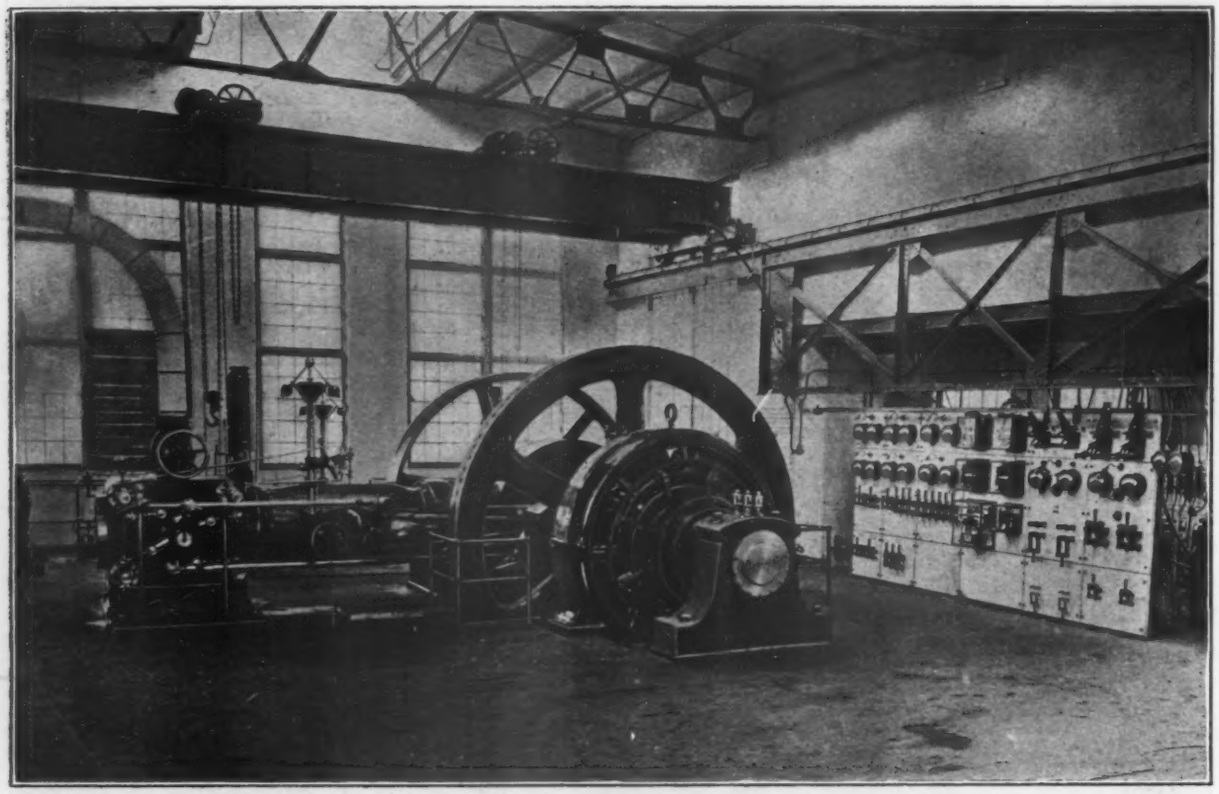


Fig. 8.—View in the Power House.

partments, and a large room is occupied by the stenographic force. The second floor is devoted to the drafting, sales, advertising, order, billing and translating departments, and in front on this floor is a directors and conference room. The building is nearly fireproof. Its finish and furniture are in oak, with oak and maple floors, and the appointments of all the departments are handsome and convenient.

Historical.

The Goulds Mfg. Company illustrates the evolution that has marked the careers of so many of the older industries of the country—a growth not due to consolidation, but to the intelligent broadening of the original lines. The company is the outgrowth of the firm of Downs & Co., which established a pump factory in Seneca Falls in 1848, occupying a small stone shop. About 25 men were employed. S. S. Gould, president of the Goulds Mfg. Company, became connected with the business in 1852, and its development for more than a half century has been due to his initiative. Additional property was purchased in the fifties, and what was then regarded as an extensive plant was built. The present corporate name dates from 1864. There was a succession of additions in the sixties, and a fire in 1870, which destroyed the works and resulted in their rebuilding on a larger scale. In the past 30 years numerous additions have been made, until now the company employs upwards of 1000 persons and occupies over 500,000 sq. ft. of floor space. Its products embrace about 1500 kinds of pumps, from the small bucket variety to large pumps for water works, with a capacity of 5,000,000 gal. in 24 hr.

Proposed Rule of Transcontinental Railroads.

The rule or condition regarding loss or damage which the transcontinental railroads propose to incorporate in their commodity tariffs is said to be substantially as follows:

Commodity rates named in this tariff are for shipments made subject to the following conditions:

No carrier or party in possession of any of the property provided for in this tariff shall be liable for any loss thereof or damage thereto from causes beyond its control, or by floods, or by fire, or by quarantine, riots, strikes or stoppage of labor, or by leakage, breakage, or decay, rust of metals or metallic goods, escape of bees, live poultry or live fish, tearing, cutting or soiling of fabrics or paper in bales or bundles, fermentation of liquids, chipping of stone or manufactures thereof, injuries of live animals to themselves or each other, or from any cause to property carried on open cars.

Shippers who do not desire to forward shipments under above provision must note on the shipping order or bill of lading "carrier's risk," in which case an additional charge of 20 per cent. will be made.

This rule differs only slightly from a standing rule of the Western classification, and similar provisions are found in the Official and Southern classifications. These rules, however, have never been enforced. Transcontinental officials say that their purpose in incorporating it in the tariff, as a condition of the commodity rate, is to make it valid and binding on both the shipper and the railroad.

R. L. A.

One of the best lubricants for cutting aluminum in a lathe is said to be kerosene oil, as it to a great extent prevents the liability to tear the surface of the metal and enables a better finish to be obtained.

Hydro-Electric Power at Duluth.

The Great Northern Power Company's Developments.

BY DWIGHT E. WOODBRIDGE.

For more than 30 years the plan of a water power development at the head of Lake Superior, based on the improvement of the St. Louis River, has been under consideration. Beginning with the financing of the Northern Pacific Railroad by Jay Cooke & Co., Mr. Cooke dreamed of the utilization of the St. Louis River's fall of nearly 500 ft. by the construction of direct hydraulic dams in series, and it was not until a short time before his death that an active association of Duluth men secured from him his rights and lands along the river. By that time the improvement in electrical machinery, transmission, &c., had so far changed the method of utilization of water powers that it seemed best to completely reverse Mr. Cooke's ideas, and the present Great Northern Power Company development has resulted.

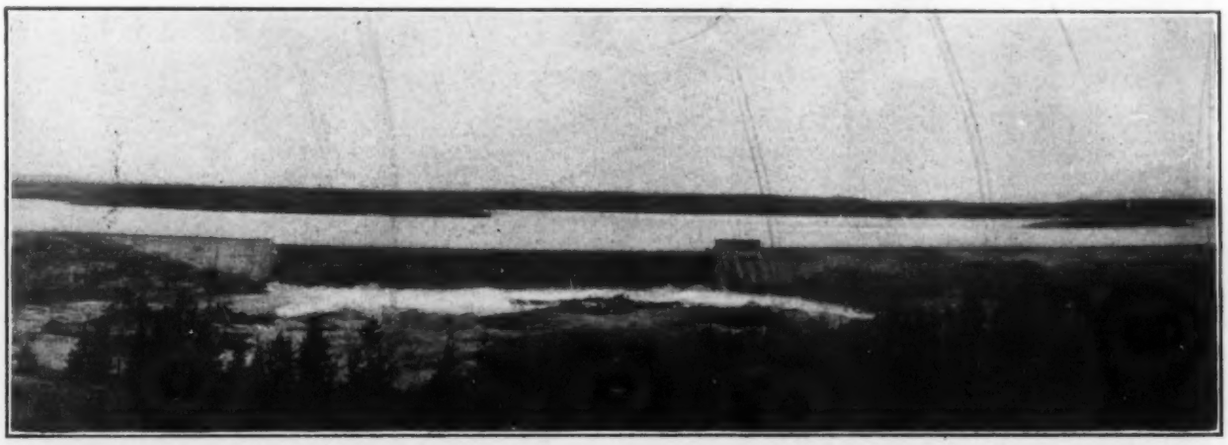


Fig. 1.—Part of the Service Reservoir, Main Dam and Spillway and Rock Wasteway of the Great Northern Power Company.

For the past seven years the Great Northern Power Company has been at work, in preliminaries, construction and, since September 13, 1907, in operation. Great difficulties have been overcome, and the work is now in successful and continuous operation, with power to the amount of 22,000 hp. under contract, though not yet all in use, and already with a sufficient income to more than care for its fixed charges and operating costs. It may be said, therefore, that the dream of a generation has been fulfilled.

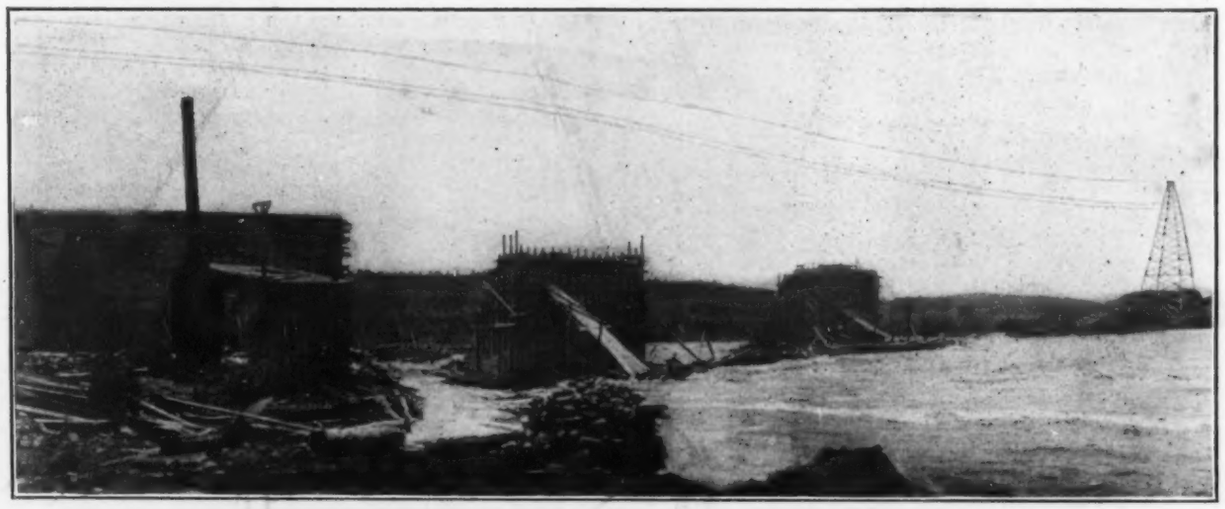


Fig. 2.—Construction of the Main Dam of the Great Northern Power Company, Showing Forms and Overhead Carrier for Handling Concrete.

A Most Interesting Hydro-Electric Development.

In many respects this is the most interesting hydro-electric proposition so far consummated, in that it combines all features that enter into any water power development. While at Niagara, for instance, no storage is necessary and the comparatively short vertical drop of the column of water makes its momentum slight, and its speed regulation simple, the operation at Duluth includes all factors of storage and regulation of water, from that whose periodicity is years and seasons to that which is of instantaneous application; while its mile long column of water, 7 ft. in diameter, coming down at the rate of 12 ft. a second, is of such character that whenever load conditions change the tendency is for momentum and pressures also to change and to a most considerable degree. It is a strictly up to date undertaking, substantial and worked out with exceeding care and accuracy. Architecturally it is consistent, solid and handsome. Its projectors have been notably fair and above board in meeting other interests and adverse rights.

This work includes a 3700 square mile drainage area, largely consisting of spongy swamps, forests and hills of little value for agriculture, with a clay subsoil, drained by one series of rivers converging above the works into the St. Louis River, which drops over a series of slight falls and long rapids till it debouches into the harbor of Duluth-Superior, a combined fall of 465 ft. in a distance measured in tangent of less than 5 miles. Within this drainage area are numerous basins sufficient for storage reservoirs, and covering lands from which the bulk of the standing pine timber has been removed, making the prop-

erty of little value. In the entire area are still standing large tracts of pine, which companies with a combined annual capacity for manufacturing some 400,000,000 ft. expect to denude in the next 8 or 10 years. Of the total fall of 465 ft. on the lower reach of the river, the Great Northern Power Company has developed 378 ft. in the present hydro-electric station, and expects to develop an additional 70 ft. below the generating station.

The Preliminary Investigations.

In planning its works the company was able to secure Government records of rainfall for 37 years, and its own gaugings of river flow have been carried forward for a

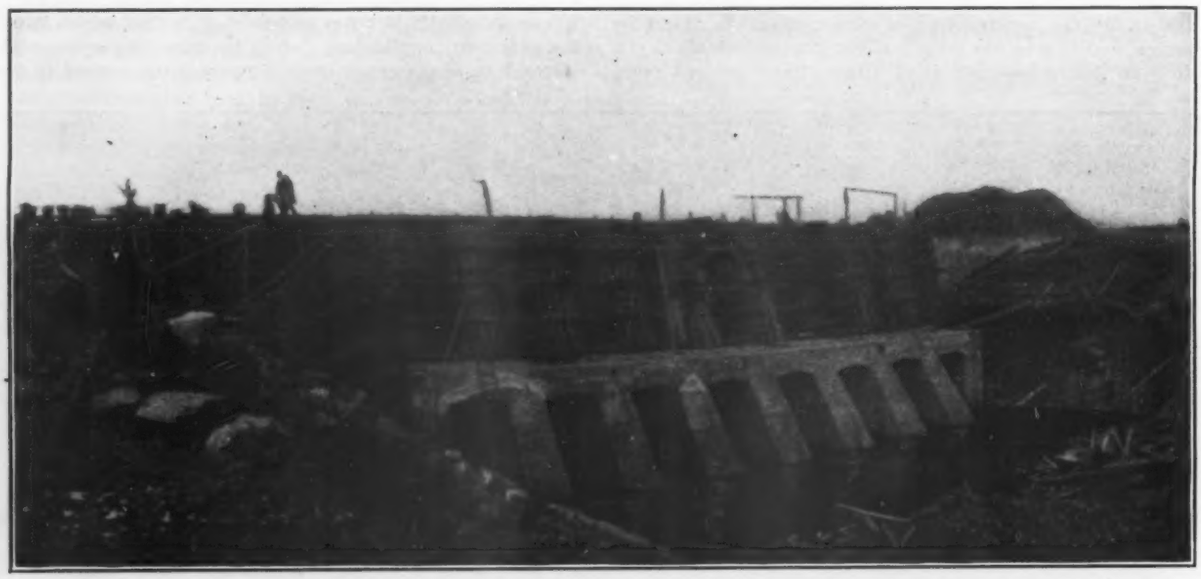


Fig. 3.—Curtain Wall, Under Construction, and Eight Submerged Arches for Pipe Lines, at the Head of the Line of the Great Northern Power Company.

period of seven years, these latter including the most exaggerated term of rainfall deficiency that has ever been known, this ending in the year 1902. At this time there was a year of low rainfall, coming after four years of great deficiency. The minimum flow at the date when the effect of this drouth showed its culmination in run off was but 500 cu. ft. per second. The company took this figure, and the period of deficiency in which it culminated, as the basis for its calculations of water storage necessary, after arbitrarily increasing the deficiency by 20 per cent., and estimates of the storage reservoirs required for the ultimate capacity of the plant have proceeded upon that basis.

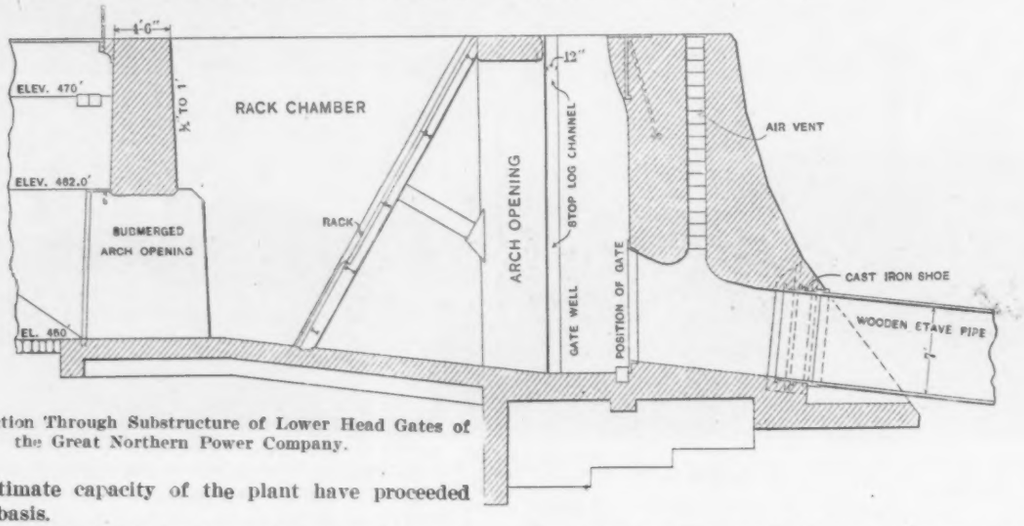


Fig. 4.—Section Through Substructure of Lower Head Gates of the Great Northern Power Company.

A system of reservoirs has been planned, to be established as required, conserving the run off and regulating the flow of the catchment area from year to year and season to season. One of these has been constructed. There is also, at the upper end of the present improvement, a service reservoir for the regulation of the daily flow, making a pondage to avoid a waste of water for short periods. The forebay, moreover, is planned for a regulation into finer periods of time than the service reservoir permits, averting frequent changes and regulations at the headgates; while near the power house a stand pipe will act as a safety valve for the regulation of instantaneous changes in customers' requirements of water. This careful regulation of water supply is necessitated by the extreme fluctuations of the flow and the low minimum of the river. On account of topography, &c., the cost of the system of storage reservoirs for the ultimate works will be exceedingly light.

Extent of the Power Plant.

The plant is laid out for the symmetrical development of eight units of a generator rating of 10,000 hp. each, of which three are completed and in operation, and the remainder are to be installed as occasion requires. For this power the storage reservoirs planned, the service reservoir, canal, forebay, &c., already built, are sufficient, and to increase to this limit there need but be added single units of pipe line, wheel and generator and distributing system to the amount desired. Below this power house is an available fall of 70 ft., at which a dam is planned that will furnish 10,000 hp. A further increase of 55,000 hp. is available when additional storage dams are placed in the catchment area.

Provision has been made for the extension of this development to an ultimate based on using 9 in. of the run off from the drain area, regulated by storage reservoirs, and upon an ultimate station load factor of 60 per cent., which rate was arrived at after careful study of the various industries in this locality likely to use the power, and of those deemed liable to be developed in the district. Judging from present indications, it is not likely that this station load factor will be less than 60 per cent. If it

should prove to be greater, less units of power will be required, and vice versa, to utilize the same amount of water, the design providing for flexibility in that direction. This flexibility, of course, including all that portion of the design from the service reservoir to the wheels. It has been the aim of the company and its contracting agents to secure as high a load factor as possible, and the

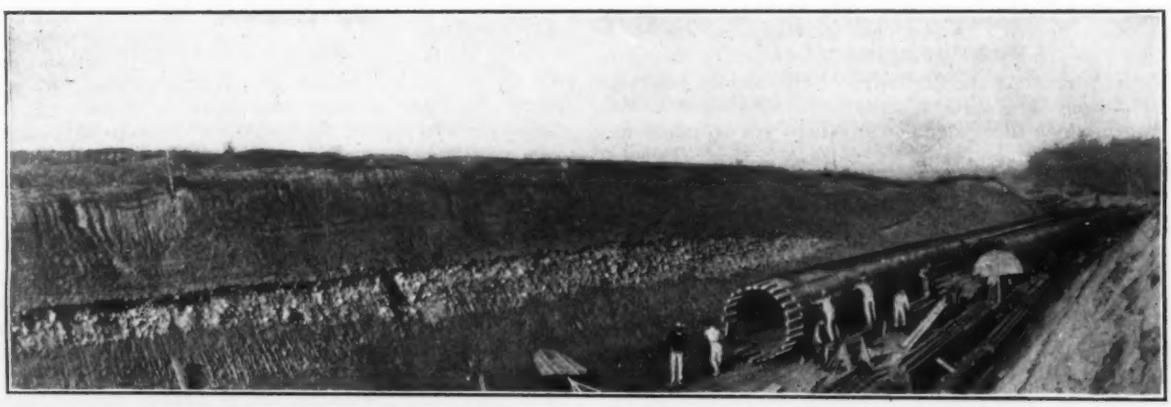


Fig. 5.—First Installation of Three Pipe Lines, Under Construction in Trench, of the Great Northern Power Company.

various contracts in force accomplish this result excellently.

By a distinct development this latter portion of the power can be doubled, but it is considered quite doubtful if this ultimate development shall be undertaken, at least for a long time. It calls for the diversion of the water from some of the area and through some of the storage reservoirs, by the way of several small channels and through a low elevation to the hights directly above Duluth, there to fall through pipes 740 ft. to wheels. With this proposition adopted, the ultimate capacity of the

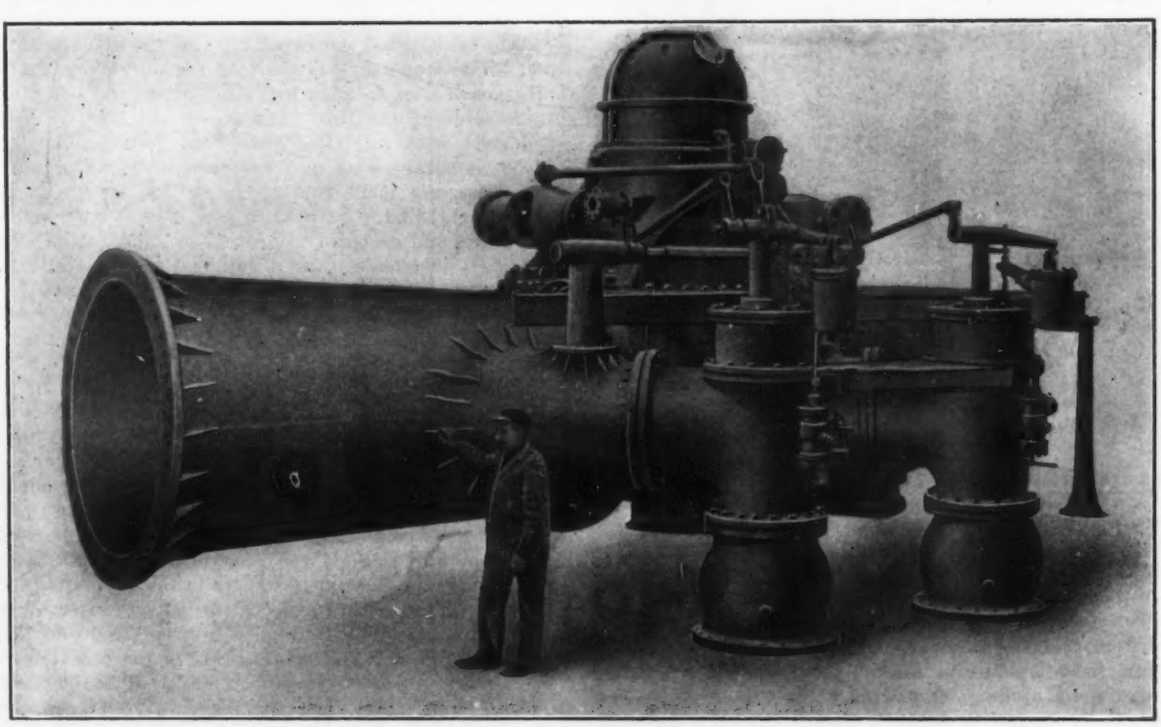


Fig. 6.—One of the Great Northern Power Company's 13,000-Hp. High Pressure Francis Turbines.

company will be 200,000 hp.—without it, 145,000 hp.—at a load factor of 60 per cent., and based on utilizing each year water equivalent to a 9 in. fall over the drainage area, which is the minimum run off.

The Service Reservoir.

There is a service reservoir, Fig. 1, near the village of Thomson, 464 ft. above Lake Superior, of a gross capacity, on its 12 ft. of available draft, of 130,000,000 cu. ft. of water, amply sufficient to accomplish the purposes of conservation and regulation before referred to. This reservoir is about 1½ miles by ½ mile in surface area, and the greater portion of its bounding walls on the lower sides is of upturned slates. A main dam, Fig. 2, was built across the channel, with a dozen low dams, of earth, rock, with concrete core, and concrete, connecting the slate walls. Most are of the gravity type, concrete retaining dams. The main dam is of concrete, and is 110 ft. long, its spill way section is 365 ft. long, 40 ft. high and 42 ft. wide at the base. In this part of the dam are three sluice ways with gates 7 x 9 ft., controlled by stems passing up into covered gate houses.

In order to form an ample spill way for the maximum floods of the river, a section of the slate ridge has been cut off to 18 in. above the level of the spill way section of the dam. This opens above a small creek, which flows into the main river below the dam. On account of the fact that the maximum flood of the river has been as high as 50,000 cu. ft. per second, 100 times the minimum flow of deficiency seasons, this precaution is considered necessary. One of the dozen dams around this service reservoir is a segment of a circle, whose arc is 100 ft. It has a clear span of 60 ft. at the crest, and is 60 ft. high at the deepest point. The space to be dammed and the configuration of the ground made such a form of wall most economical.

This service reservoir has an important function in clearing the water from needle ice. No anchor ice has ever been observed in this river. Needle ice, on the contrary, the result of water below the freezing temperature meeting a physical shock, is naturally frequent on

the St. Louis River below Thomson, and the head gates of this development. Due to the nature of the river above the lower reservoir little such ice is liable to be found there. The mile and a half stretch of quiet water in the service reservoir is a sufficiently considerable body of water to dissipate such ice should any form. If any should make in the open canal below, it will be again dissolved in the quiet water of the forebay. In the racks at the lower ends of these two reservoirs no needle ice has so far been observed. As to anchor ice, conditions are excellent. The river becomes covered by ice and snow in its quieter parts. At the discharge of the service reservoir and forebay are curtain walls with submerged arches through which the water flows. These are of ample sec-

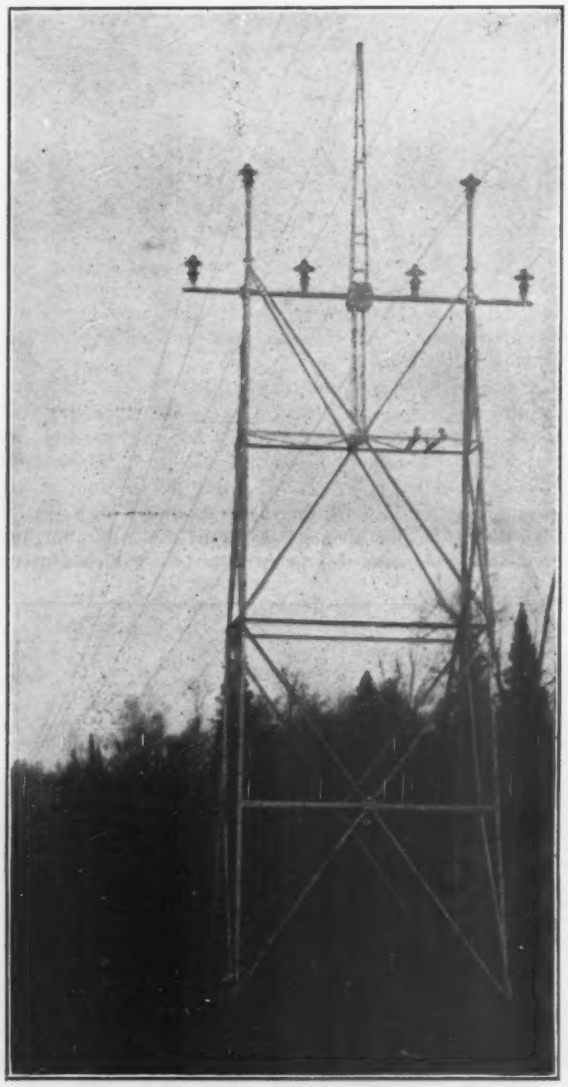


Fig. 7.—Transmission Lines of the Great Northern Power Company.

tion to make the current passing through them quite slow. It is a fact that, while the entire surface of the service reservoir may be covered with bark, chips and other débris from saw and pulp mills above, the water coming out of these arches and flowing along the canal toward the power station is perfectly clean, although the rack screens in the reservoir are coarse. Another series of curtain walls, submerged arches and a finer rack will perform the same duty at the lower end of the forebay.

The Canal and Forebay.

Water from the service reservoir passes into a canal 8500 ft. long to the forebay itself, 3000 ft. long. This canal is excavated for its entire length in the slope of a hillside. For a mile of its length it is through clay and occasional rock ridges; the remainder of its length is in slate rock section, with occasional earth interpositions. The limiting condition of construction of the earth section was the required capacity of the canal or sufficient water to supply 80,000 hp. at the power house, and erosion of its banks at a speed of water of 3 ft. per second. In order to harmonize conditions it was planned for a cross section of 36 ft. wide at bottom, 15 ft. deep and slopes of 2 to 1. It was originally designed that the entire canal should be lined with concrete, which would have lessened the grade and diminished the cross sections. But this plan was changed, and the base of the earth canal was built 66 ft. wide and the slopes steeper than originally designed, in part because the work was done by steam shovel and the wider full excavation was cheaper. In the rock sections the cross section is in no place less than 450 sq. ft., though somewhat irregular. The Northern Pacific Railroad crosses this canal on a plate girder double track bridge of 70-ft. span on concrete abutments. As a protection to the forebay embankment, which is an earth mass of some 500,000 cu. yd., there is a canal spillway of concrete 200 ft. long which can discharge into a stream flowing into the river below.

The forebay itself is of about 40 acres in area, its lower side being an embankment and its upper side merely the contour of the hillside on water level. At its lower end the water is designed to debouch into eight pipe lines, three of which are constructed, and all of which are to be of 7 ft. diameter. Water is drawn into these pipes from the bottom of the forebay through eight submerged arches, Fig. 3, one for each pipe line, and a screen, with large sluice gates, one for each pipe line. These gates will be operated by motors controlled locally and from the switchboard in the power house. Fig. 4 illustrates the course of the water at this point. A sluiceway has been provided for flushing out of the way all ice and débris that may collect in front of the curtain wall. As before stated, so far nothing has come down the canal that will require attention.

The Pipe Lines and Connections.

Pipe lines carry water from the forebay to the wheels. At this point the plant divides itself into units, one for each wheel. Each pipe is 5000 ft. long and drops 378 ft. The pipe for the upper 4000 ft. of distance and 150 ft. of drop is of wood construction, and the remainder of steel. The wood pipe is built of redwood clear timber staves, each stick forming its proper arc of the 7-ft. circle of diameter of the line. The staves are tied by ¾-in. steel rods with malleable shoes and turn buckles and spaced along the pipe in accordance with the pressure. The staves are made continuous for the length of the line by metal plates inserted in saw cuts at each end of each stave, and designed to prevent leakage. Each wood pipe at its foot passes into a cast bell shaped section of the steel line, where it is thoroughly caulked with lead and oakum. There are similar sections at the upper ends of the wood pipes. The steel pipe is of plates thoroughly riveted and designed with a factor of safety of 5, with an allowance of 1-16 in. for rust. The steel work of the pipe line was dipped in hot asphalt when laid. The entire line is laid in a covered trench, Fig. 5. At its lower end this pipe is anchored in concrete built up from bedrock beneath the power house. Although the grade of this line is continuously down, automatic air valves have been placed at points where there is a variation in grade, to prevent any possible tendency toward the formation of a vacuum due to sudden changes in the speed of water.

These pipe lines are expected to deliver water at the rate of 335 cu. ft. per second, equivalent to 10,000 electrical horsepower. The friction loss in the pipe lines is equivalent to about 10 ft. of head, and that in the canals is about 6 ft. more when running full. A steel tower, surmounted by a tank 30 x 69 ft., stands on the bank above the power house, the top of this tank being 23 ft. above the water of the forebay. This standpipe is connected by a set of risers into a cross receiver, with each of the pipe lines, and is the final one of the various plans for water regulation, having as its especial function the relieving of instantaneous changes of pressure due to additional or less loads on the wheels through momentary changes of consumers' demands. It will not only care for excess pressures due to lessening of load, but to slighter pressures due to increased load, while the water in the pipe lines is gaining acceleration to meet the increased demands of the wheels. The standpipe has sufficient capacity to take up a load of 15,000 hp. until the

water in the pen stocks is sufficiently accelerated from the main lines to care for it. This figure of 15,000 hp. was considered ample for the purpose. The standpipe will also avert any tendency toward a vacuum along the pipe lines, being above their level, or will catch any air bubbles that may have gotten into the line. It will also permit, by means of cross connections, the operation of all the pipe lines in unison, no matter how small or how large may be the amount of power in use and the number of wheels in operation, thus keeping water in circulation in all of them, avoiding friction, loss and danger of freezing.

The Wheel House and Its Equipment.

Water is carried into a fireproof building ample for four wheels and designed as about half of what will be erected when the entire eight wheels of this portion of the company's development shall have been called for. It is now 77 x 181 ft. in area and 90 ft. high. In a high basement are the penstocks, water wheels, pumps, &c., and on the floor above them are three generators and their exciters, with room for another wheel. The turbine water wheels, each of 13,000 hp. rated capacity, and known to be capable of running up to 18,000 hp., are of a modified Escher-Wyss design, built by the Allis-Chalmers Company, Fig. 6. They have vertical shafts, are directly connected to the generators above, and are of the Francis pressure type, the wheel operating at 375 rev. per min. Penstocks connect them with the pipe lines, the water column having at the wheels a diameter of 66 in. In each penstock is to set a hydraulically operated gate valve, the first of which was placed in position a few days ago. These are the largest ever constructed for such pressures. They weigh 35 tons each and occupy a floor space 28 ft. long. Relief by-pass valves have been installed in each penstock between the big valves and their water wheels, two on each. These are modified Escher-Wyss, one arranged to operate automatically from the governor of the wheel or set to open at certain presures; the other to work as a pop valve with the standpipe and to open before it overflows. These are operated in multiple through the cross receiver of the standpipe, and if one fails the remaining ones will serve. It will be noted that these water wheel units are the largest and most powerful ever put into service. The running portion of each wheel is 62 in. in diameter, and their speed is greater than any other wheels of such size.

Each generator is of 7500 kw., and is a 25-cycle three-phase 6600-volt General Electric machine. The revolving field is mounted on the vertical shaft of the wheel, and the whole weight of the revolving element of the unit is carried on an oil thrust bearing on the shaft. Oil is fed to the bearings by two-stage force pumps that can deliver it at 400 lb. pressure. The current generated is stepped up for transmission to the substation in single 7500-kw. three-phase oil insulated watercooled transformers, these being the largest in service. They are 14 88 ft. high, 15 ft. long and 5.88 fe. wide, and contain windings to transform the current to 30,000 or 60,000 volts, as desired. The core and windings weigh about 65 tons, and can be lifted bodily out of the casing, as they are attached to the covers. Worthington surface condensers cool the oil for these transformers, and it is driven to the transformers by a special motor pump set. With an actual capacity running overload of 18,000 hp. at the wheels and with an overload capacity in generators of 50 per cent. for a period so long as to care for any probable peak of load, these form a most imposing combined unit of power, considerably exceeding anything now in operation.

Power is carried to a city distributing station 14 miles away, with the wires placed on steel towers, Fig. 7, along a right of way 100 ft. wide, the property of the company. These towers are spaced from 300 to 1000 ft. apart and are from 40 to 60 ft. high, changing conditions depending on topography. These are carrying a voltage of 30,000 on No. 00 six-strand copper cables. An overhead steel cable is carried on the towers as a lightning arrester, and a telephone line, running into insulated booths, is also carried along beside the high tension lines.

Machinery at the city station consists of transformers to get the high tension currents down to 13,200 volts, at which potential it is supplied to large consumers. The Duluth & Superior street railroad systems, utilizing direct current at 600 volts, are supplied through motor generator sets that change over the alternating to direct current for this purpose. There are three of these of 1500 kw. each and one of 750 kw. in the city stations.

Voltage on the transmission lines has been fixed at so high a potential as mentioned in order that, if desired, current may be transmitted a considerable distance, and

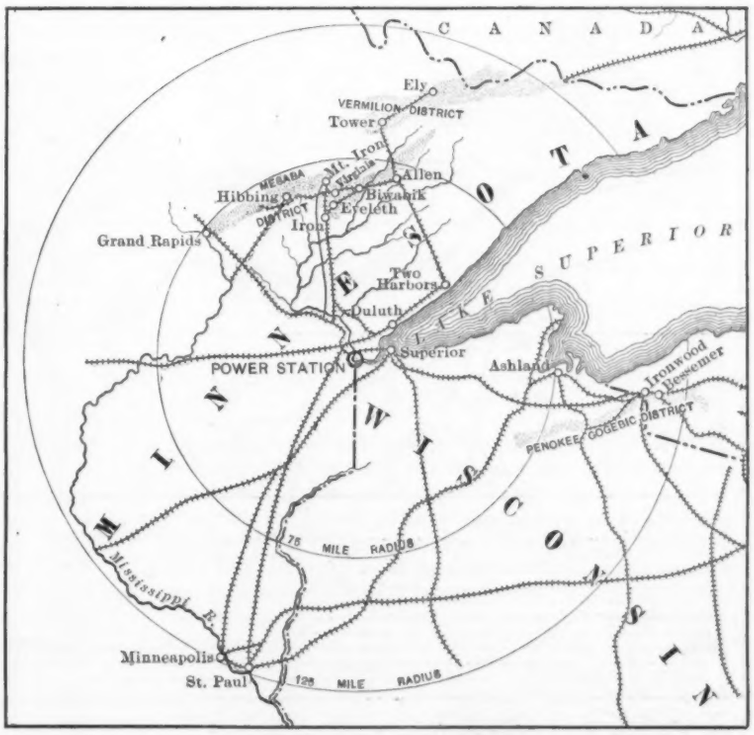


Fig. 8.—Map of the Region Capable of Being Supplied with Power by the Great Northern Power Company.

it is estimated that power consuming centers up to 150 miles away may be considered under the system. These, as shown in Fig. 8, would include the cities of Minneapolis and St. Paul and intervening points and the Mesaba, Vermillion and Gogebic ore ranges, which consume about 40,000 hp. in steam, for pumping, hoisting, &c. But it may be doubted if these more distant fields are invaded by the company, for the local market, for power has grown amazingly since the inception, due in part at least to the decision of the United States Steel Corporation to erect at Duluth a modern open hearth steel works.

Local Distribution of Power.

The company has now contracts for the delivery of 22,000 e.h.p., and has several excellent and good sized contracts in sight. Those to whom it is now supplying power are the street railroad and commercial lighting and retail power companies of Duluth and Superior; the Duluth city pumping station, which has just installed a General Electric turbine pump of 13,500,000 gal. capacity in 24 hr.; the American Carbolite Company, which is now operating nine furnaces and is adding more up to an immediate total of 21, each of which requires about 350 hp.; the Zenith furnace company, which operates a blast furnace, a coal dock and coke ovens; the Berwind Fuel Company and Northern Fuel & Dock Company, having

coal docks, these being the first, by the way, to operate with alternating current; the Duluth, Missabe & Northern Railroad's and Pittsburgh Fuel Company's No. 5 dock and Clyde Iron Works, to be connected up next spring; the Great Northern Railroad's elevator system, and others. Additional concerns are gradually connecting up, and it is probable that all the modernly equipped among the 20 or more great coal docks at the head of the lake will be electrically operated soon. There has been talk of electrifying the terminals of the Duluth, Missabe & Northern Railroad, but this project is now in abeyance. The Steel Corporation will require considerably more power than its waste gases from by-product coking will furnish economically, and has been considering as high as 10,000 hp. from the great Northern Power Company.

In laying out the system of underground distributing cables through the cities at the head of Lake Superior, it was assumed that the development of power would be along the water front, and the company now has some 12 miles of cable skirting the harbor and railroad lines, as well as 16 miles of overhead circuits, additional to the main feeders from the power station. One of the cables is laid across the harbor to Superior, in a trench dredged 30 ft. below low water line, or 8 ft. beneath the keel of the deepest laden ship that can pass the Sault River, either now or during the continuance of the present Governmental plan for the improvement of the lakes.

The two large power buildings of the company are of most pleasing and substantial design, fitted for their purposes. They are entirely fireproof, built of steel, brick and concrete. They have steel frame superstructures set with brick masonry and trimmed with concrete blocks, instead of stone. The floors are of steel reinforced concrete, where they are not heavy arches, and the roofs are of tile, covered with asphalt and gravel. The interiors of the main rooms are wainscoted in white enamel brick and finished above with white and buff brick laid in right lines in panels between the columns of the steel frames. Other interior faces are in white brick, giving a fine diffusion of light all through the buildings. Traveling cranes of large capacity cover the main units.

The entire electrical equipment has been supplied by the General Electric Company, and is exceedingly complete. In the wiring scheme for the power stations, all connections between the bus bars and the units are made through motor operated oil switches, all arranged for distant control from a benchboard placed on a gallery that gives the operator unobstructed view of the main units. All low tension wiring is insulated and carried in conduits laid in the floors, while all high tension wiring is bare and is hung on insulated supports in brick compartments. Throughout the scheme each set of unit wiring can be carried through any transformer and to any one of the transmission lines, and this plan will be continued as the number of units is increased to the maximum. For the control of the entire 80,000 hp., there is a switchboard that is less than 19 ft. long and so unusually compact. In the center of this board is the panel containing control of all station lighting and power, and on each side are four panels, one for each of the eight units of the completed plant.

A map of the system, with the profile of the line, is shown in Fig. 9. Origination of this Great Northern power works, now so happily completed, was the result of a visit to Duluth some eight years ago of C. C. Cokefair, then a resident of Plainfield, N. J. His son, Frank A. Cokefair, became interested and worked out the general plan and its details. After some years of work carried forward by them and one or two associates, a local company was organized, of which C. A. Duncan of Duluth was made president, several large capitalists of Duluth becoming interested. Chas. D. Barney & Co. of New York and Tucker, Anthony & Co. of Boston acted as syndicate managers for the underwriters for the bond issue, and the Knickerbocker Trust Company of New York became trustee. F. O. Blackwell of New York, J. T. Fanning of Minneapolis and W. A. Brackenridge of Niagara have been consulting engineers, working in conjunction with F. A. Cokefair, who has been chief engineer throughout the entire period of construction.

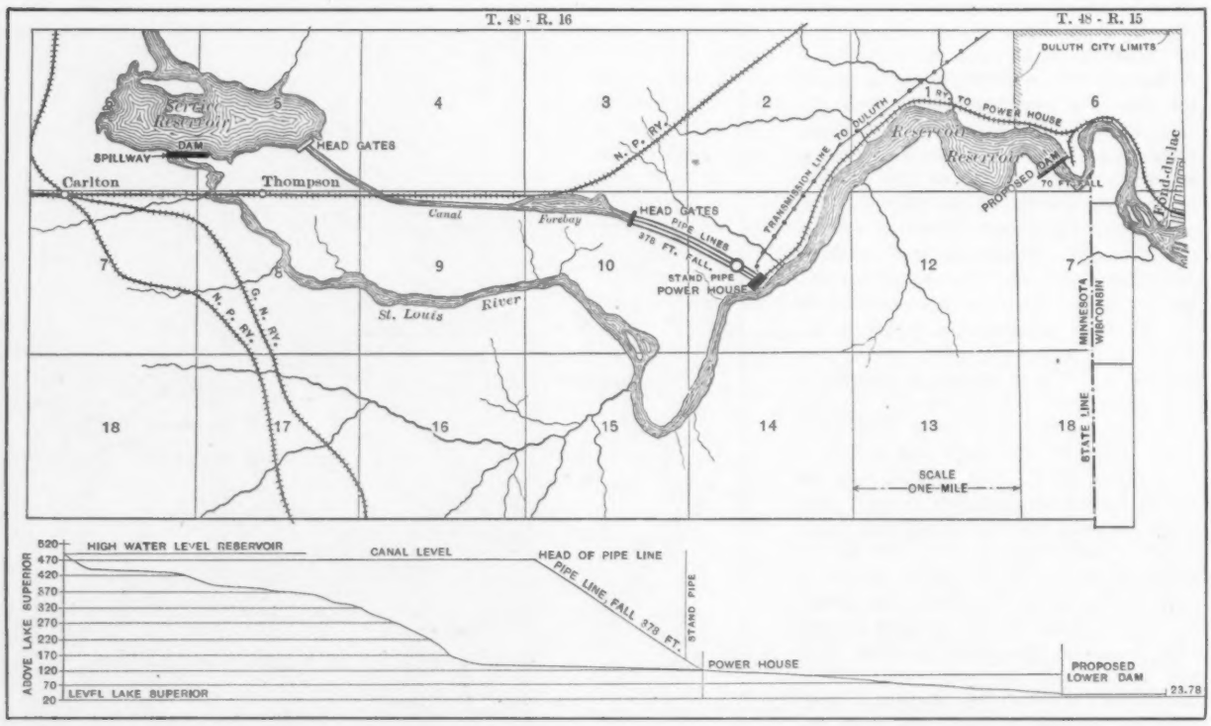


Fig. 9.—Map of the Great Northern Power Company's System from the Service Reservoir to the Power House and Beyond, the Profile Being Shown Below the Map.

The soil pipe plant of the Coosa Pipe & Foundry Company at Gadsden, Ala., has been closed down for the holidays. Work will be resumed this week with at least half a force, which will be gradually increased. Eight pipe floors will be put in operation, and the fitting foundry will run with a full force.

Following elaborate experiments to prevent the recurrence of accidents to submarine vessels, the French Minister of the Navy has issued orders that all submarines be supplied with detachable telephone buoys which in case of accident, will permit of communication with the surface.

Foundry Blower Practice.*

BY WALTER B. SNOW, BOSTON, MASS.

The primary function of a blower is to move air against resistance. Its performance is dependent upon the relation expressed by the formula:

$V = \sqrt{2\,gh}$, in which V = velocity in feet per second, h = head in feet and g = acceleration due to gravity = 32.16, or $V = \sqrt{2\,g\,\frac{p}{d}}$

when h is expressed in terms of p = pressure and d = density.

When applied under the conditions of p = pressure in ounces per square inch, d = density or weight per cubic foot of dry air at 50 degrees F., and under atmospheric pressure of 14.69 lb. or 235 oz. = 0.077884 lb.,

$$V = \sqrt{64.32 \times \frac{p \times 144}{16 \times 0.077884 \times \frac{235 + p}{235}}}$$

which reduces to $V = \sqrt{\frac{1746659 \times p}{235 + p}}$.

Allowance is evidently made therein for compression of air but not for change of temperature during discharge.

In Table I the velocities were calculated by this formula, the volumes by multiplying velocity and effective area, and the theoretical horsepower by multiplying volume and pressure.

TABLE 1

RELATIONS OF PRESSURE, VELOCITY, VOLUME AND HORSE POWER

PRESSURE PER SQ. IN. OZS.	VELOCITY OF DRY AIR AT 50 DEGREES FAHR. ESCAPING INTO OUTER SYSTEM THROUGH ANY SHAPED ORIFICE		VOLUME DISCHARGED IN ONE MINUTE THROUGH AN ORIFICE HAVING EFFECTIVE AREA OF ONE SQ. IN. CU. FT.	HORSE POWER REQUIRED TO MOVE GIVEN VOLUME UNDER GIVEN CONDITIONS
	Feet per sec.	Feet per sec.		
1	86.03	5 161.7	35.85	0.00978
2	121.41	7 284.4	50.59	0.02759
3	148.38	8 902.8	61.83	0.05058
4	170.98	10 258.6	71.24	0.07771
5	190.76	11 445.5	79.48	0.1084.
6	208.53	12 511.9	86.89	0.1422
7	224.77	13 486.4	93.66	0.1788
8	239.80	14 387.9	99.92	0 2180
9	253.83	15.229 6	105.76	0.2596
10	267.00	16 020.4	111.25	0.3034
11	279.70	16 768.1	116.45	0.3493
12	291.30	17 478.2	121.38	0.3972
13	302.59	18 155.2	126.06	0.4470
14	313.38	18 802.7	130.57	0.4986
15	323.73	19 423.6	134.89	0.5518
16	333.68	20 020.7	139.03	0.6067
17	343.26	20 595.8	143.03	0.6631
18	352.52	21 151.0	146.88	0.7211
19	361.46	21 687.8	150.61	0.7804
20	370.13	22 207.8	154.22	0.8412

For refined work, or under conditions of wide variation from the basis of the table, corrections should be made for differences in humidity and temperature.

In the ordinary processes of the foundry, where iron or the less refractory metals are to be reduced, the resistance of the crucible, air or cupola furnace will roughly range from somewhat above 1 oz. to a possible but usually unnecessary pressure in excess of 20 oz. per square inch. Up to about 8 oz. the fan blower cannot be excelled for convenience and efficiency. From 8 to 16 oz. the field is fairly divided between the fan and the rotary types, the advantage gradually shifting from the former to the latter as the pressure increases. Above 16 oz. the superiority of the rotary type is manifest, until it in turn encroaches upon the efficient field of the blowing engine at about 5 lb.; a pressure far in excess of the practical requirements of the foundry. The air compressor, as an aid to combustion, is economically useful only in connection with the burning of liquid fuel.

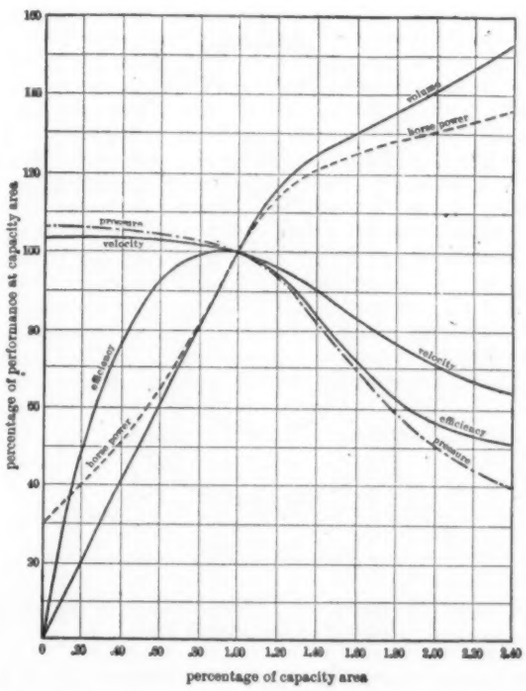


Fig. 2.—Relative Performance of a Fan at Constant Speed with Variable Outlet Area.

The fundamental differences between the fan and the rotary type of blower lie in the manner of creating pressure and in the effect of resistance. In the fan type, velocity is given to the air as it passes from the inlet to the circumference of the wheel. This is transformable into pressure with corresponding density within the inclosing case and connections; the pressure being dependent upon the speed. At constant speed, the volume and

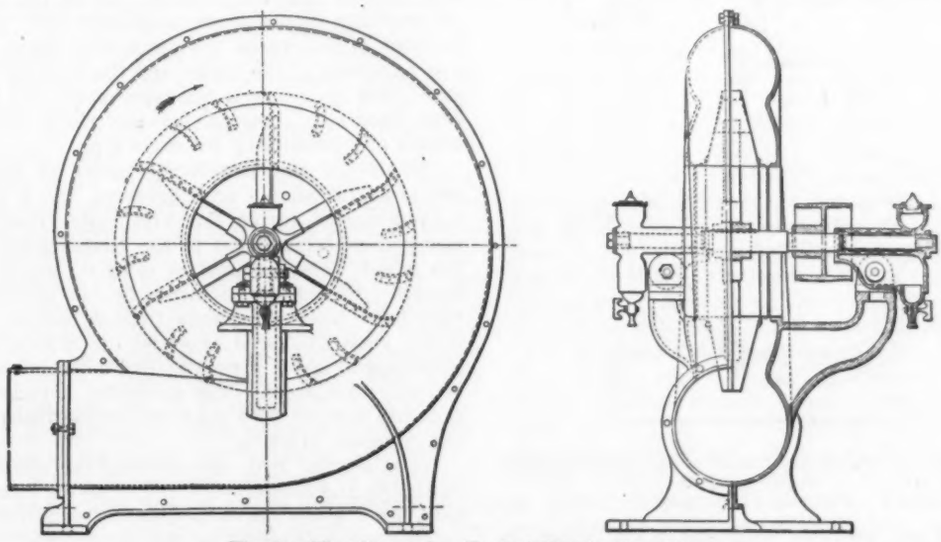


Fig. 1.—Elevations of a Typical Cupola Fan Blower.

* Presented at the New York meeting (December, 1907) of the American Society of Mechanical Engineers.

power decrease as the resistance increases. When the outlet is closed, the wheel continues to revolve, but without effective delivery, and with minimum power expenditure. In the rotary, or so-called "positive" type, air in regularly succeeding volumes is imprisoned by one or more inclosed revolving impellers, and forced forward against the imposed resistance. It is thereby compressed

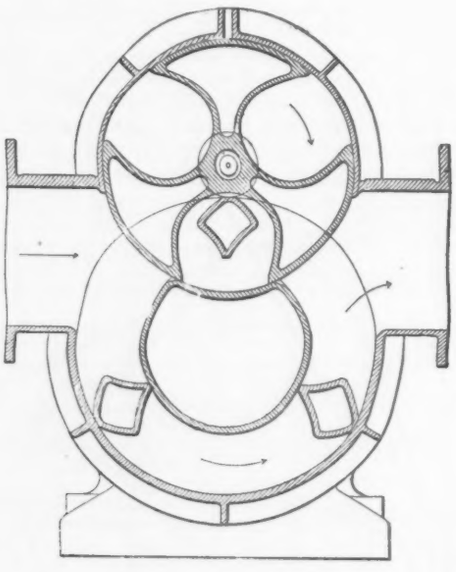


Fig. 3.—Cross Section of a Rotary Blower of the Single Impeller, Triple Bladed Type.

to a density, and given a pressure proportionate to that resistance. This pressure is fundamentally independent of the speed. The delivery remains practically constant for a given speed as long as discharge is permitted, while the power expenditure increases with the resistance. When the outlet is closed the maximum power is required and the displacement, though ineffective, is just equal to the slip; up to the limit of power to drive and of strength to endure.

The construction and proportions of a prevalent type of cupola fan blower are illustrated in Fig. 1. The cas-

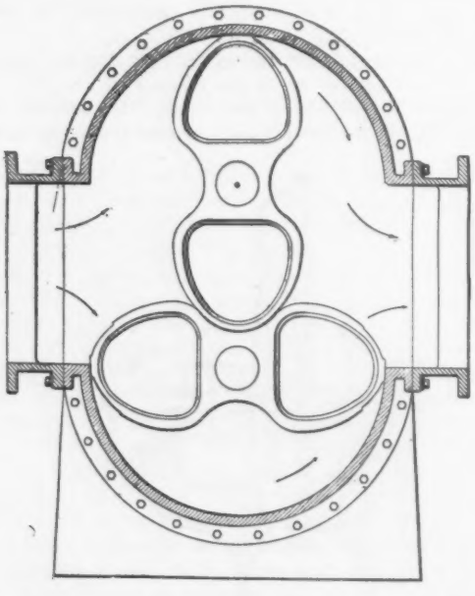


Fig. 4.—Cross Section of a Rotary Blower of the Double Impeller Type.

ing and wheel are provided with two inlets, which, in ordinary construction, are about one-half the diameter of the wheel. The width of such a wheel at its periphery ranges from 5 to 8 per cent. of the diameter, the width between side plates at the inlet being approximately one-sixth of the diameter. From six to eight major blades extend from inlet to circumference; between these are one, two or three minor blades of about one-half the radial length. All blades are slightly curved backward at the circumference of the wheel. The cast iron casing is of involute form, its greatest diameter being approximately one and three-quarter times the diameter of the inclosed wheel. In the volume type, designed for much lower pressures, such as are required in air furnace operation, the peripheral width of the wheel ranges from 20 to 40 per cent. of its diameter. The casing is often of steel plate.

Refined consideration of blower design is not necessary in a discussion of foundry blower practice, but a knowledge of fundamental principles and empirical relations is essential to a clear understanding of the subject. The manufacturers' rating of the type of blower shown in Fig. 1 is based upon the greatest effective area over which it will maintain the maximum velocity of discharge. As originally established by Sturtevant, this "capacity area" or "square inches of blast" is represented by the empirical formula

$$\text{Capacity area} = \frac{DW}{3}$$

in which D = diameter of wheel in inches, and W = width of wheel at circumference in inches. This formula

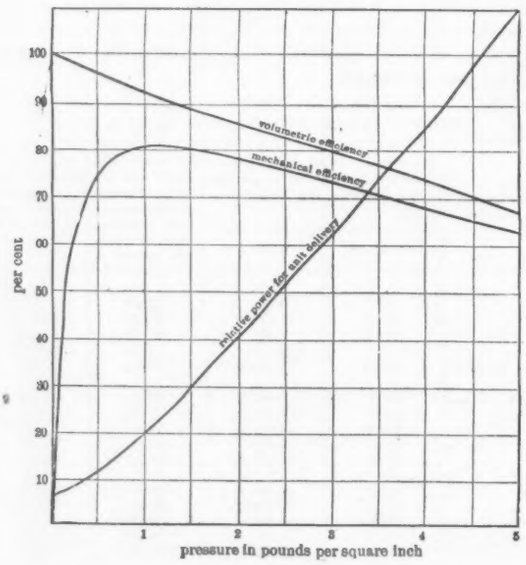


Fig. 5.—Relative Performance of a Single Impeller Rotary Blower at Constant Speed with Variable Resistance.

was derived from the pressure type of fan blower. The value of the divisor must necessarily vary with the proportions of the wheel, the number of inlets, the number and curvature of the blades and the form of the inclosing case. But as a merely arbitrary basis, the formula has been generally accepted for the ready comparison of wheels of substantially the same type.

Manifestly the maximum velocity of discharge will create the maximum total pressure. As a factor in the manufacturers' rating this attainable velocity has been accepted as being equal to the circumferential speed of the wheel. This assumption is by no means universally correct. Recent developments in fan construction with very large inlets, numerous shallow blades and unusual width, show discharge velocities far in excess of the circumferential speed, approximating a theoretical maximum of twice that speed. But successful application of such fans has not yet been made under the resistance obtaining in cupola practice.

It is evident that, disregarding the effect of changes in density and temperature, the following relations should hold for a given fan with constant capacity area: The volume varies directly as the revolutions; the pressure varies directly as the square of the revolutions, and the power varies directly as the cube of the revolutions. These relations clearly point to the economic desirability of closely proportioning the fan to the work it is to perform. An increase of only 25 per cent. in the speed,

which may be necessitated by deficiency in the volumetric capacity of a given fan, nearly doubles the power required, and creates a pressure more than 50 per cent. in excess of that at normal speed. It is seldom that the sum of fixed charges and operating expense cannot be materially reduced by substituting a larger and more costly fan for one that must be run at unnecessary speed to deliver the required volume.

TABLE 2
PERFORMANCE OF CUPOLA FAN BLOWERS AT CAPACITY AREA PER INCH OF PERIPHERAL WIDTH

DIAM. OF WHEEL INCHES CAP. AREA SQ. INS.	ITEM	"j" TOTAL PRESSURE IN OUNCES PER SQUARE INCH										
		6	7	8	9	10	11	12	13	14	15	16
18 in. 6 sq. in.	r.p.m.	2660.0	2860.0	3050.0	3230.0	3400.0	3560.0	3710.0	3855.0	3990.0	4120.0	4250.0
	cu. ft.	520.0	560.0	600.0	640.0	670.0	700.0	730.0	760.0	786.0	810.0	830.0
	h.p.	1.7	2.1	2.6	3.1	3.6	4.2	4.8	5.4	6.0	6.6	7.3
24 in. 8 sq. in.	r.p.m.	2000.0	2150.0	2290.0	2420.0	2550.0	2670.0	2780.0	2890.0	2990.0	3090.0	3190.0
	cu. ft.	700.0	750.0	800.0	850.0	890.0	930.0	970.0	1010.0	1040.0	1080.0	1110.0
	h.p.	2.3	2.9	3.5	4.2	4.9	5.6	6.4	7.1	8.0	8.8	9.7
30 in. 10 sq. in.	r.p.m.	1590.0	1720.0	1830.0	1940.0	2040.0	2140.0	2230.0	2310.0	2390.0	2470.0	2550.0
	cu. ft.	870.0	940.0	1000.0	1060.0	1110.0	1160.0	1210.0	1260.0	1310.0	1350.0	1390.0
	h.p.	2.8	3.6	4.4	5.2	6.1	7.0	7.9	8.9	10.0	11.0	12.1
36 in. 12 sq. in.	r.p.m.	1330.0	1430.0	1530.0	1620.0	1700.0	1780.0	1850.0	1930.0	2000.0	2060.0	2120.0
	cu. ft.	1040.0	1120.0	1200.0	1270.0	1340.0	1400.0	1460.0	1510.0	1570.0	1620.0	1670.0
	h.p.	3.4	4.3	5.2	6.2	7.3	8.4	9.5	10.7	11.9	13.2	14.5
42 in. 14 sq. in	r.p.m.	1140.0	1230.0	1310.0	1380.0	1460.0	1530.0	1590.0	1650.0	1710.0	1770.0	1820.0
	cu. ft.	1220.0	1310.0	1400.0	1480.0	1560.0	1630.0	1700.0	1770.0	1830.0	1890.0	1950.0
	h.p.	3.9	5.0	6.1	7.3	8.5	9.8	11.1	12.5	13.9	15.4	17.0
48 in. 16 sq. in.	r.p.m.	1000.0	1070.0	1150.0	1210.0	1270.0	1330.0	1390.0	1450.0	1500.0	1550.0	1590.0
	cu. ft.	1390.0	1500.0	1600.0	1690.0	1780.0	1860.0	1940.0	2020.0	2090.0	2160.0	2230.2
	h.p.	4.5	5.7	7.0	8.3	9.7	11.2	12.7	14.3	15.9	17.7	21.0

For the ordinary type of fan it has been generally accepted that within the capacity area the velocity and pressure are maximum and constant, and the volume and horse-power are proportional to the area. These relations are only approximate, as is evident from Fig. 2. The curves are characteristic of an individual instance in which the fan ran at constant speed while discharging through various outlet areas. All values are relative to the performance at capacity area. Changes in the proportion or the speed of the fan would materially affect these relations, causing them to approach or recede from the conditions expressed in the preceding paragraph, and shifting the point of maximum efficiency. These curves serve to show that maximum efficiency in power and pressure are secured at or near the capacity area, that the power per unit of volume and the pressure decrease as the discharge area and volume increase, and that with closed outlet the power is approximately one-third of that at capacity area.

No simple exact basis of calculation can be established for varying fan proportions and conditions, but for all practical purposes the manufacturer's basis, although only approximately correct, is sufficiently accurate, particularly in cupola practice, where operation at or near the capacity area is essential. Upon this basis Table 2 has been calculated to show the performance at capacity area per inch of peripheral width of typical diameters of cupola fan blowers. Basic values are taken from Table 1, the air being dry, and of 50 degrees F. temperature; the velocity of discharge is taken as equal to the circumferential speed of the wheel, and the power, as double the theoretical. While 50 per cent. efficiency is below that which may be attained in good cupola installations, it is always desirable to provide ample surplus above the power required at capacity area. Even a change of 50 degrees from the ordinary inlet temperature makes a difference of about 10 per cent. in the power.

Characteristic types of single and double impeller rotary blowers are presented in Figs. 3 and 4. In the type shown in cross section in Fig. 3, the single impeller is made up of three diamond shaped blades extending from a central web. On either side of the web a stationary core fills the space within the inner circumference of the blades, forming in connection with the inclosing case an annular space within which they revolve. The rotor which coincidentally revolves in the smaller part of the casing, successively provides pockets to receive and pass the impeller blades to the suction side without allowing compressed air to escape.

In the type shown in Fig. 4, both impellers are symmetrical and alike. The surfaces are so formed, and the impellers are so located on their respective shafts, as to permit of rotation with uniform clearance, and without metallic contact. Release of air on the discharge side of each impeller is practically coincident with the cut-off of admission on the inlet side.

In both types, the air passing through the inlet is imprisoned, and carried forward to the outlet side. Here it meets and mingles with an air of greater density, already compressed by previous action of the impellers. Equalization of pressure instantly results. As a consequence, there is more or less fluctuation coincident with the revolutions of the blower. The degree of fluctuation depends upon the ratio between the released volume and the total volume under compression, and also upon the extent to which the air has been previously compressed in transit through the blower. This occurs in the case of the single, but not of the double impeller type here illustrated.

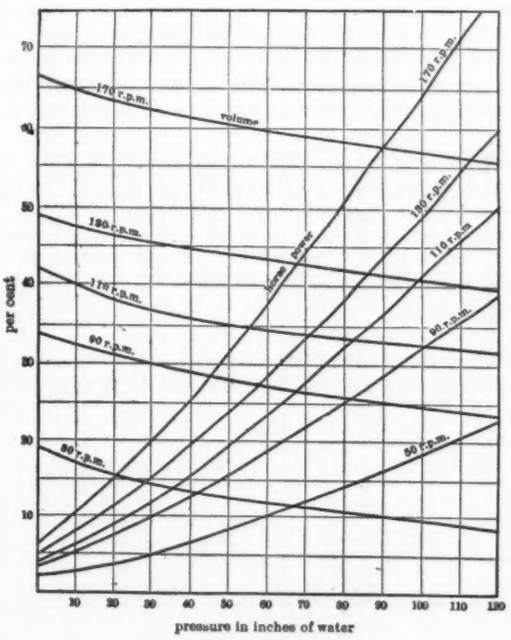


Fig. 6.—Relative Performance of a Double Impeller Rotary Blower at Various Speeds and Pressures.

The theoretical relations in a rotary blower having a fixed free area of discharge and no slip, are those in the fan type operating within its capacity area, namely, the volume, and consequently the velocity, vary as the number of revolutions, the pressure varies as the square, and the power as the cube of the revolutions. But here the similarity ends, for in the fan the number of revolutions is an essential function of the pressure, while in the rotary blower they are entirely independent. In other words, material change of total pressure with the fan type can only be secured within the capacity area by change in revolutions, while with the rotary type, great range in pressure is attainable, at constant revolutions by merely varying the resistance. Under constant speed and variable outlet or resistance, the performance relations of a theoretically perfect rotary blower are as follows, the effect of changes in temperature and density being disregarded: The volume is constant; The velocity varies inversely as the effective outlet area; The pressure varies inversely as the square of the outlet area, hence as the square of the velocity, and the power varies

directly as the pressure. But the mechanical necessity of clearance, and the consequent slip or backward leakage, affect these relations particularly as the conditions depart from the field of maximum efficiency. The slip is approximately proportioned to the square root of the pressure difference between the atmosphere and the imprisoned air, that is, to the velocity which it creates. Therefore the volumetric efficiency decreases as the pressure increases.

Fig. 5 presents characteristic curves showing relative performance of a single impeller blower of the type illustrated in Fig. 3. The rapid drop in mechanical efficiency at pressures below ½ lb. is manifest. The performance of a two impeller type, like Fig. 4, at different speeds and resistances, is illustrated by the curves in Fig. 6. Volumes and horsepowers are relative.

Under specific conditions of constant speed and resistance, it might be possible to establish the superiority of one type of blower based primarily upon first cost and operative efficiency. But conditions vary as do blowers, which for commercial reasons are built in stated sizes from which selection must be made. Hence the problem is complicated, and the solution depends largely upon the intangible factor of "adaptability." With no purpose of definition as to advantages or disadvantages, the characteristics of the two types operating within practical limits may be thus summarized and contrasted: With a fan blower the maximum pressure is determined by the number of revolutions; with a rotary blower it depends upon existing resistance or the weighting of the

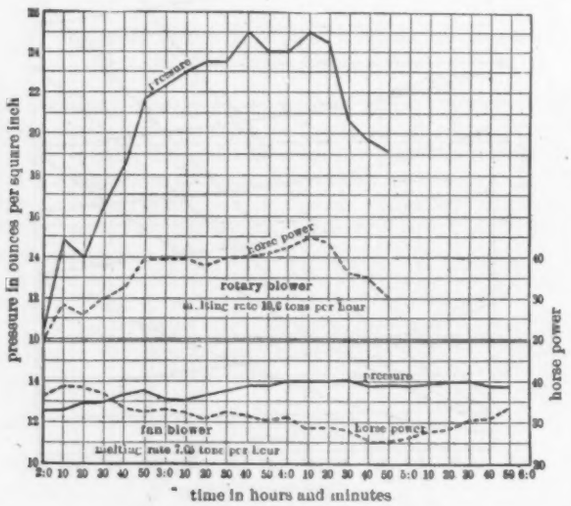


Fig. 7.—Performance of Fan and Rotary Blower on a 54-In. Cupola.

relief valve. The volume discharged by a fan blower depends upon the outlet area and the corresponding pressure; in the rotary type it is independent of both. The maximum power is required when a fan blower discharges against the least, and when a rotary blower discharges against the greatest resistance. The fan blower automatically increases the created pressure as the opposing resistance becomes greater, until it equals the maximum pressure capacity of the fan. The volume, although coincidentally decreased, is rendered effective by the greater pressure, while the power is roughly proportional to the effective work. The rotary blower is likewise automatic up to the limit of pressure temporarily established by the resistance of the relief valve, but without material change of volume, and with increase in power. Above the pressure limit set by the valve, air escapes to the atmosphere, and the power expended thereon has no useful effect. The weight and cost of a fan blower are far less and the speed far higher than in the case of a rotary blower; at low pressures the efficiency of the fan is superior, while at the higher pressures necessary in the cupola, the rotary type excels.

As the total head or pressure created by a blower represents the sole means of producing movement of the air, whatever portion of this head is consumed in overcoming the frictional resistance of piping and fuel, reduces by just so much the amount remaining available for the production of velocity. The greater the ratio between the surface of a pipe and the quantity and the higher the velocity the greater is the resistance. Were the outlet in the casing of a fan blower to be made equivalent to the capacity area the velocity and corresponding friction would be excessive. But in both the fan and rotary types, the area of the outlet is such that the velocity of discharge seldom exceeds 3000 ft. per minute. Even this is so great that material saving in power may be secured in a long pipe by making its area considerably in excess of the blower outlet. For instance, the frictional loss in 100 ft. of 10-in. pipe, with 3000 ft. velocity, will be practically 1 oz., while that in a 12-in. pipe, passing about the same volume at 2000 ft. velocity, will be approximately ⅜ oz. If a certain velocity pressure is required at the final delivery the blower, if distant, must create a total pressure sufficiently in excess to allow for the loss by friction. A drop of a couple of ounces is not uncommon with an ordinary piping system.

The actual conditions in a conduit may be determined by a Pitot tube, and calculations of volume made therefrom. The most satisfactory form of instrument appears to be that devised by D. W. Taylor. Care must be exercised in the use of any form of pressure gauge to avoid misleading readings. This is particularly true regarding determination of pressure in the wind box of a cupola, wherein the direction of air currents is uncertain.

The modern cupola furnace is typical of metallurgical progress in which conservation of heat has been secured by massing fuel and metal. As arranged in successive charges with a melting zone of maximum temperature beneath, the best possible opportunity is presented for the gradual ignition of the fuel and heating of the metal in their downward course. It would at first appear that equal facility was provided for securing complete combustion, and that the quantity of air furnished might closely approximate the chemical requirements. But to secure the best results the volume is reduced in practice considerably below that theoretically required; of necessity incomplete combustion results. The conditions are closely similar to those in the blast furnace. The reason for this condition is the arrangement of the superimposed charges of fuel and metal with relation to the air supply, which necessitates passing through the lower charges all of the air required for those above. Although perfect combustion with an excess of air is thereby secured in the melting zone the tendency of excessive dilution is to cool the gaseous mixture to a temperature even below that of the molten iron. Under such conditions less heat is transferred to the upper changes, because of the higher velocity and lower temperature of the gases.

The air supply to a cupola is not, therefore, to be determined by the chemical requirements of the entire body of fuel, but by the excess which the lower charges are able to endure without disastrous cooling. The level of the ignition zone, and the completeness of combustion, are necessarily limited by this excess. The introduction of two or more rows of tuyeres with large aggregate area, has served to distribute the air admission, to reduce the cooling effect in the melting zone, to raise the level of the ignition zone, and to perfect the combustion. But a coincident—and otherwise beneficent—increase in the hight of the charging door has still prevented the attainment of complete combustion, although a larger proportion of the heat is utilized. Authoritative chemical analysis of the escaping gases are exceedingly rare, but such as are available show that only about 50 per cent. of the carbon combines to form carbon dioxide. The balance escapes as an element of carbon monoxide, having less than one-third of the heat value. In other words, only about two-thirds of the possible heat of combustion is utilized. This indicates a shortage of about 25 per cent. in the air supply.

Intermittent operation of the ordinary cupola is not conducive to the ready utilization of the waste heat by external means, as in the blast furnace. Further economy is therefore to be sought within the cupola itself, and in the application of the blower thereto, presumably along the lines in which improvement has already been

made. The air supply to a cupola is usually expressed in cubic feet per net ton of iron melted. The amount necessarily varies with the melting ratio, the density of the charges, and the incidental leakage. Fair average practice is represented by the following:

6 lb. iron per pound coke, 33,000 cu. ft. of air per ton of iron.
7 lb. iron per pound coke, 31,000 cu. ft. of air per ton of iron.
8 lb. iron per pound coke, 29,000 cu. ft. of air per ton of iron.
9 lb. iron per pound coke, 27,000 cu. ft. of air per ton of iron.
10 lb. iron per pound coke, 25,000 cu. ft. of air per ton of iron.

It is customary to provide blower capacity on a basis of 30,000 cu. ft., which corresponds to 75 or 80 per cent. of the chemical requirements with average coke, and a melting ratio of 7.5 to 1. This is evidently ample for any higher ratio.

Obviously, neither the rate of combustion, nor the rate of melting, can remain constant under the varying conditions within the cupola. In fact, it is not fundamentally necessary that they should. But the blower is usually

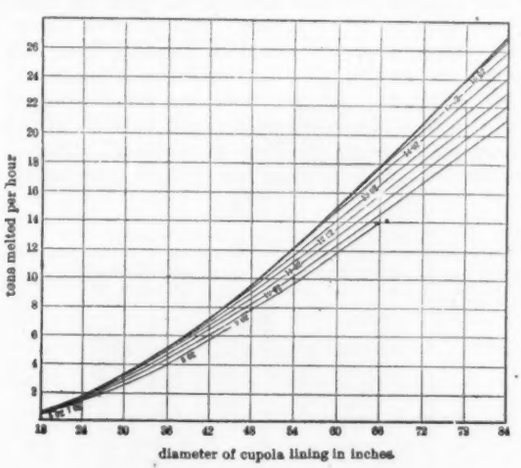


Fig. 8.—Cupola Performance at Different Pressures.

run at constant speed, and delivers uniform volume except as reduced by resistance. As a rule, this reduction, which occurs only in the case of the fan, is relatively slight, for the volume (of which the velocity is a function) varies as the square root of the pressure. Hence, for instance, a 20 per cent. drop in pressure entails only about 10 per cent. loss in volume. Fairly constant pressure with a more regular, though not uniform volume, is therefore to be expected in fan blower cupola practice, as well as a moderate melting rate due to delayed combustion, resulting from reduction in air supply coincident with increase in resistance.

As ordinarily installed the resistance of a cupola will never exceed the pressure which a rotary blower can create if sufficient power is supplied. If no relief valve is provided, or it is set high enough to prevent escape, all air must be discharged through the cupola, hence the volume will be practically constant. As the pressure equals the resistance considerable variation is to be expected during the heat, while owing to the maintenance of uniform air supply, a more rapid rate of melting may be possible than with the fan.

These expectations are usually fulfilled in practice, although the contrast lessens as the proportioning of the blower to the cupola approaches the ideal. So far as the blower is concerned its actual volumetric output, relatively to the cupola requirements, is the determining factor in the melting rate. Fundamentally, the resistance regulates the volume in the case of the fan, while the volume regulates the resistance in the case of the rotary blower. Otherwise expressed, the fan type adjusts itself to the conditions, decreases the power and volume and somewhat reduces the melting rate, while the rotary type in a resistless way continues to force through the cupola the prescribed volume regardless of immediate requirements or power expenditure, and usually maintains the maximum hourly output.

For the purpose of illustration, extreme contrasts between the operation of a fan blower and a rotary blower are graphically presented in Fig. 7. These curves are based on tests reported by H. E. Field at the December, 1904, meeting of the Pittsburgh Foundrymen's Association. The blowers, a No. 10 Sturtevant fan and a 33-cu.-ft. Connersville rotary, were installed for alternate use in connection with a 54-in. cupola. So far as possible the charges were alike in weight and character in both cases. The scrap was heavy, and of such shape as to pack closely. Here are practically identical conditions of cupola and contents, but great contrasts in operation, which show the effect of variation in air volume and pressure. With the fan blower the pressure was comparatively constant, the variation being between 12½ and 14⅛ oz. in the wind box, with an average of 13.6. The net power ranged from 25 to 38.5 hp., with an average of 31.2. The pressure with the rotary blower varied through the extreme range between 10½ and 25 oz., while the average stood at 20.63. The variation in horsepower was between 19 and 45, the average being 35.8.

With the fan 28.84 tons were melted in 3.77 hr., at the rate of 7.65 tons per hour, while with the rotary blower 2.82 hr. were required to melt 31.5 tons, at an hourly rate of 10.6 tons, an increase of nearly 40 per cent. in output. This reduces to a net input of 4.09 hp. per ton melted per hour with the fan and 2.98 hp. with the rotary blower, an apparent advantage of 27 per cent. in favor of the rotary. By far the larger quantity of air was discharged by the rotary blower, the rate of melting being closely proportional to the volume, as may be shown by a careful analysis of the tests. The rate is low for the size of the cupola, extremely so in the case of the fan, and is in part at least the result of excessive resistance presented by large pieces of scrap. The results shown by these tests emphasize the possible effect of changes in the relation of the blowers to the cupola. Had the rotary blower been of smaller capacity such excessive pressures would not have been necessary to force the constant volume through the cupola, the power would have been decreased and the duration of the heat prolonged, with probable decrease in the horsepower hours per ton. Had the fan been run at higher, but not excessive, speed to permit of passing of a larger volume, which it was fully capable of delivering, the horsepower would have increased, the time decreased and the power

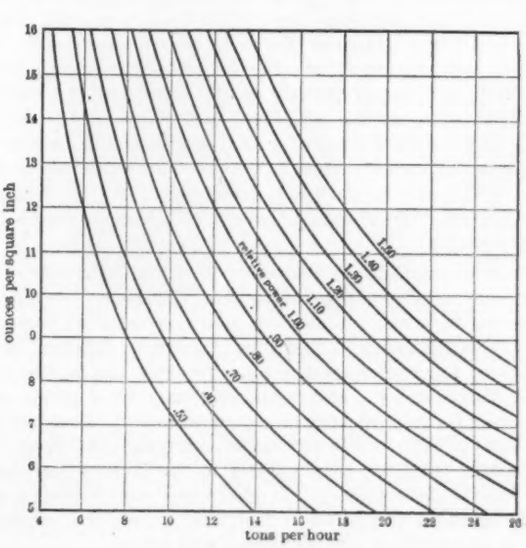


Fig. 9.—Rotative Power for Different Pressures and Melting Rates.

per ton per hour would certainly have more closely approached that required by the rotary blower. In a subsequent test made upon the same cupola equipped with a No. 8 Sturtevant fan the conditions were identical, except that a small amount of very light scrap was charged. The results showed 9.41 tons melted per hour, with an average pressure of 12.5 oz., and a power expenditure per ton per hour less than 80 per cent. of that required with the No. 10 fan.

The preceding indicates the difficulties of exactly proportioning blowers to their work, and the futility of comparing ultimate efficiency upon such limited experiments.

In contrast thereto it can be shown that a No. 10 Sturtevant fan, upon a 60-in. cupola, regularly melted 13.8 tons per hour, with an expenditure of 2.6 hp. per ton, and a No. 8, upon a 42½-in., required only 2.9 hp. per ton upon a total output of 6.46 tons per hour. And likewise that rotary blowers of identical size and quality have shown results both inferior and superior to those here reported.

The higher speed of melting, which, because of its ability to overcome excessive resistances, may be maintained by the rotary blower, is universally recognized, as is also the increased time thus rendered available for molding before the first iron is tapped. But the greater pressure incident to the higher rate is much more severe upon the the lining, while the value of the time gained for molding depends upon individual foundry conditions. The superior mechanical efficiency of the rotary type is more or less offset by much lower first cost and fixed charges on the fan. The necessity of providing power capacity greatly in excess of the average in the case of the rotary blower is not to be overlooked. Neither is it to be forgotten that the brief duration of the heat reduces the difference in annual expenditure for power to a relatively unimportant item. For instance, under the exceptional conditions in the tests shown in Fig. 7, the daily difference in electrical horsepower hours input was only 20.3. On a basis of 10 hr. per day this equals only 2 hp. continuously exerted.

Theoretically, for otherwise constant conditions, the following relations hold for cupolas and melting rates within the range of practical operation: The melting rate with constant volume varies directly as the square of the diameter—that is, as the cross sectional area of the cupola, and directly as the volume, as the square root of the pressure—and as the cube root of the power for a given cupola; the volume varies inversely as the square of the cupola diameter for a given melting rate, and directly as the melting rate for any cupola; the pressure with a given cupola varies directly as the square of the volume—that is, as the square of the melting rate—and as the depth of the charges for a given melting rate; the power with a given cupola varies directly as the cube of the melting rate, and as the cube of the square root of the pressure, and directly as the pressure for a given melting rate and any cupola—*i. e.*, inversely as the fourth power of the diameter for a given melting rate; the power per ton per hour (the operating efficiency) for a given cupola varies directly as the square of the melting rate—that is, as the pressure—and for a given melting rate directly as the rate for a given pressure, directly as the pressure and inversely as the fourth power of the diameter; and the duration of the heat for a total output for a given cupola varies inversely as the square root of the pressure.

These relations might afford practical formulæ were accurate coefficients possible, but the great variety in cupolas, tuyerage proportions, and character of fuel and iron, the difference in charging practice in different foundries, or the variety in the same foundry are bewildering and discouraging. Maximum efficiency in a given case can only be assured after direct experiment. Even though subject to some variation under working conditions, the preceding relations point clearly to the factors that make for maximum efficiency. It is obvious that pressure and melting rates should be as low, and cupola diameters as great as practical considerations will allow.

High pressure is a relic of small tuyere area in a single course, of coal as fuel, of false economy in buying a fan blower so small as to require excessive speed to deliver the required volume, or a rotary blower so proportioned to the cupola that high pressure is inevitable, and above all, of forcing the cupola beyond the economical limit. It is no longer considered creditable to secure the largest possible output from a given cupola; it is better practice to use a larger cupola for the same output. The tendency is distinctly toward moderation, both because of higher ultimate operating efficiency and the improved quality of the castings. Figs. 8 and 9 clearly indicate the economy of such a course. It is to be noted that although the curve of maximum output in Fig. 8 is freely drawn through points representing good current practice, it conforms closely to the relations that the melting rate varies directly as the square of the diameter. Wide variations are to be expected in individual cases. The maximum pressures capable of maintaining the corresponding melting rates under proper conditions vary with the diameter and the hight of the cupola, as well as with the proportions of the charges. Other melting rates are plotted in proportion to the square roots of lesser pressures for corresponding cupola diameters. It is, however, because of the great variety in conditions that the values indicated by this or any other set of curves are purely relative and cannot be made directly applicable to cupola practice in general. The power economy of low pressures and melting rates is clearly shown by Fig. 9. The lines of unit expenditure have been arbitrarily fixed in the middle field of good practice.

The actual melting range of a cupola is ordinarily between 0.6 and 0.75 ton per hour per square foot of cross section. The limits of air supply per minute per square foot are roughly 2500 and 4000 cu. ft., with the mean as representative of fair practice. The possible power required varies even more widely, ranging from 1.5 to 3.75 hp. per square foot, corresponding respectively to 2.5 and 5 hp. per ton per hour for the melting rates specified above. Current practice can only be expressed between limits as in the case of Table 3. Therein is given the ordinary range of the different variables for

TABLE 3
RANGE OF PERFORMANCE OF CUPOLA BLOWERS

DIAMETER INSIDE LINING. IN.	CAPACITY PER HOUR TONS	PRESSURE PER SQ. IN. OZ	VOLUME OF AIR PER MIN. CU. FT.	HORSE POWER
18	0.25- 0.5	5- 7	150- 300	0.5- 1.5
24	1.00- 1.5	7- 9	600- 900	2.0- 6.0
30	2.00- 3.5	8-11	1 200- 2 000	5.0- 15.0
36	4.00- 5.0	8-12	2 200- 2 800	10.0- 23.0
42	5.00- 7.0	8-13	2 700- 3 700	12.0- 32.0
48	8.00-10.0	8-13	4 000- 5 000	18.0- 45.0
54	9.00-12.0	9-14	4 500- 6 000	22.0- 60.0
60	12.00-15.0	9-14	6 000- 7 500	30.0- 75.0
66	14.00-18.0	9-15	7 000- 9 000	35.0- 90.0
72	17.00-21.0	10-15	8 500-10 500	45.0-110.0
78	19.00-24.0	10-16	9 500-12 000	52.0-130.0
84	21.00-27.0	10-16	10 500-13 500	60.0-150.0

stated cupola diameters. The specified pressures prevail most extensively in recent installations. In so far as it is possible to determine the melting rate and the necessary pressure therefor, the power may be roughly calculated, from the theoretical requirement of 0.27 hp. to deliver 1000 cu. ft. per minute against 1 oz. pressure. The power increases directly with the pressure, and is practically dependent upon the efficiency of the blower. This will range from 50 to nearly 70 per cent. in a good fan installation, and up to a possible maximum of 90 per cent. with a first class rotary blower. The drop in pressure due to an extended system of piping must not be neglected in such calculations.

The trend toward lower pressures in the cupola is reflected in current air furnace practice. The high pressure fan blower with small volumetric capacity has been superseded by the volume fan having ample capacity at much lower pressure. Both volume and pressure are dependent upon the quality of the coal and the rate of combustion. The deep fire lends itself to complete utilization of the air supply, with minimum excess and maximum temperature. Both under and over grate supply pipes should be of ample size to avoid excessive loss by friction, and the pressure should be the lowest which, with a properly proportioned blower, will pass the required volume. This pressure need not exceed 2½ oz. per square inch, and under good conditions should be considerably less. The volume delivered beneath the fire may be kept well down toward the theoretical requirements, not exceeding 200 to 225 cu. ft. per pound of coal. In the crucible furnace still lower pressures prevail, but the air supply is not as effectively utilized. Flexibility in the application and operation of a blower is sufficient to permit of approximation in its size. Unfortunately its size number conveys no idea of its capacity, although rotary blowers are secondarily classified by volumetric displacement. The manufacturers' recommendation, checked by the purchaser's experience, must generally serve as the simplest rule of selection.

The Coometer.

An Apparatus for Analyzing Gases.

Quantities of fuel are wasted in the furnaces of almost every boiler, which might readily be avoided if the firemen had some indication of the efficiency of the combustion, such as the composition of the flue gases would afford. Numerous devices have been offered which aimed to give such an indication by automatically measuring and recording the amount of carbon dioxide contained in the waste gases. The objections to most of them are that they are too much in the nature of laboratory apparatus, being constructed largely of glass and rubber, and requiring some skill to read them and put their indications to advantage; but, worst of all, their records are not made until 2 to 6 min. after the sample of gas was taken. In the meantime there is likely to have been a material alteration in the state of the fire, and the corrections that would seem to be required might be entirely unsuitable. At best it is a matter of guesswork. In the ordinary hand firing, total combustion takes from 3 to 6 min., and it is most important to adjust the damper directly after the coal has been fired.

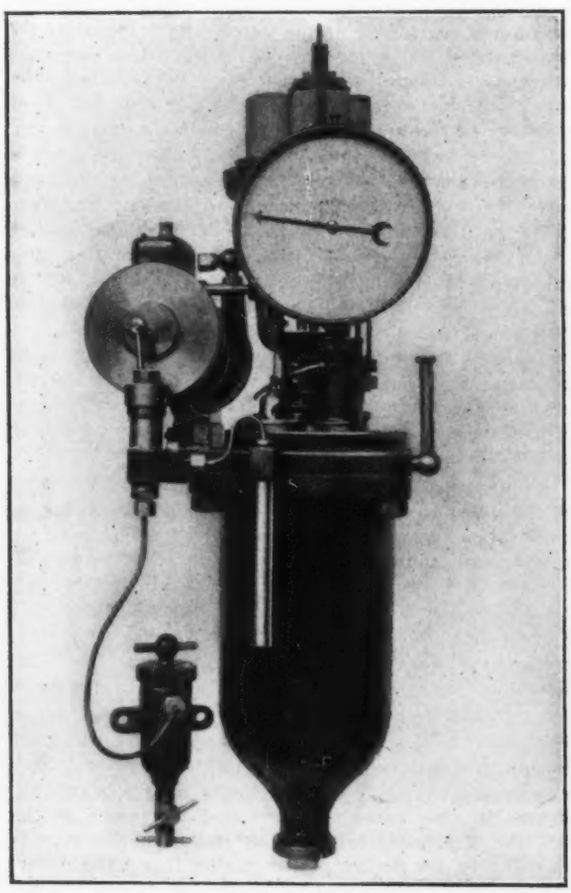


Fig. 1.—The Coometer (CO_2 Recorder), Sold by Michael Pal & Co., London, England.

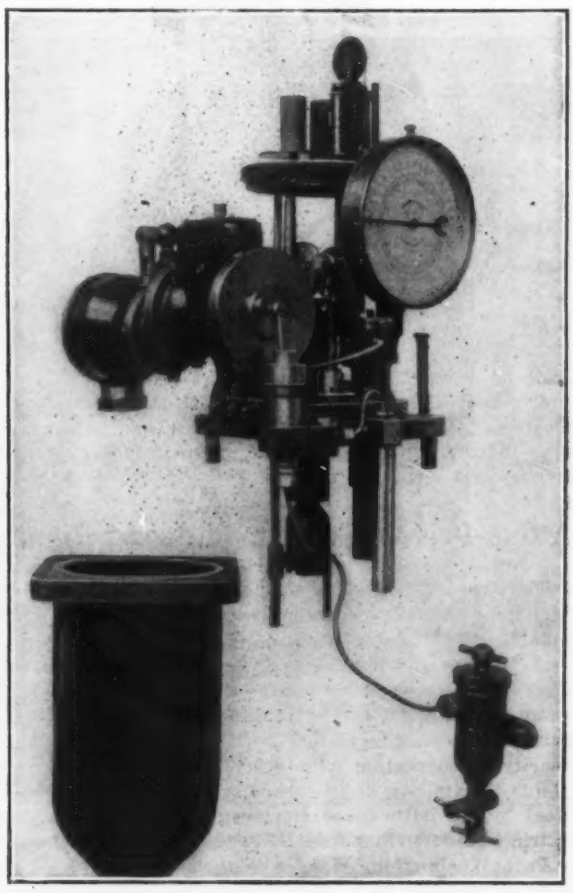


Fig. 2.—Another View of the Coometer with the Reagent Reservoir Removed.

The disadvantages of earlier forms appear to be overcome in a new combustion recorder known as the Coometer, patented by Schlatter & Deutsch and controlled by Michael Pal & Co., Parliament Mansions, Victoria street, London, S. W., England. Like a pressure gauge, it can be mounted in a convenient location in the boiler room, where the stoker can watch its records and indications and be guided in his firing. Since it makes four records every minute, an almost instant and practically continuous knowledge may be had of the condition of the fire. It is substantially constructed, being made of steel, iron and brass, and contained in a sheet iron case, protecting it from dust. Little attention is required to keep it in order.

Figs. 1 and 2 herewith show the instrument assembled and opened, and Fig. 3 diagrammatically shows its principal parts from which the manner of its operation may be understood. A connection is made at Z with a small pipe leading from a point where a fair sample of gas may be withdrawn, and the gas after passing through a filter is introduced at constant pressure when the valve G is opened. This valve is operated by the crank I on the shaft K and is opened while the piston D is making its upstroke. Before the latter begins its down stroke the valve G is closed and the valve H is opened by the crank I I. The gas, which has been drawn into the chamber L, is then forced out through the tube M and disperser B into the bell C. This bell is in communication with the vessel A, containing a solution which absorbs carbon dioxide. The measured quantity of gas, as determined by the volume of the chamber L, is reduced according to the content of CO_2, and the remainder of the gas, rising as tiny bubbles to the top of the bell C, displaces its volume of the liquid into the chamber F, raising the piston E. At this instant the crank I V releases the brake S, allowing the rack R to descend until it touches the rod T. The amount that R descends is proportional to the volume of CO_2 absorbed, and the pointer, which is rotated through the pinion X by the rack, plays over a scale calibrated to read directly in per cent. of CO_2. At the lowest position of the piston D and the highest position of the piston E, respectively, the crank disk I V again tightens the brake S against the disk X, restoring the pointer to zero and holding the rack R while the discharge valve J is opened by the crank I I I, allowing the gas collected in the bell C to be exhausted by the weight of the piston E, and another charge is drawn into the chamber L and analyzed as before. In addition to the indication afforded by the dial a permanent record is made on a drum by perforations on a continuous strip chart which is moved by clockwork. The point records made on this chart are regulated in hight by the travel of the rack R, and the fluctuations of the curve traced show how well the firing has been performed. A steam motor connected to the shaft K completes the equipment, mak-

ing the instrument entirely automatic. As a matter of course, special care is taken that the materials employed for all parts shall not be corroded or attacked by the gases or liquids, and that the cylinder F shall always contain a neutral solution and not an alkali.

With certain modifications, it is stated that the Coometer can be used for registering the analysis of other

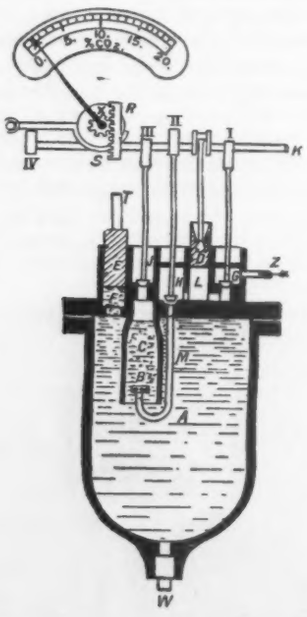


Fig. 3.—Diagram Illustrating the Action of the Coometer.

kinds of gases, such as those in gas engines, gas generators, gas stokers of any kind, and still further applications are possible in chemical, ceramic, sugar and other industries. The American rights to the Coometer have not yet been acquired.

A Gas-Driven Electric Railroad Plant.

The wonderful development that in recent years has taken place in electric interurban traction systems has made this field an inviting one for motive power engineers. Steam and hydraulic generating units which, until within a comparatively short time ago, were used almost exclusively for this service in large installations are beginning to share prestige with gas engines of large capacity in connection with gas producer equipment. A notable installation of the latter type has just been completed by the Milwaukee Northern Railway, having an electric line extending from Milwaukee, Wis., northward to Port Washington, Wis., which was thrown open to traffic on October 28.

The main power plant is located at Port Washington and comprises two concrete, steel and brick buildings, one of which houses the gas producers and the other the engines, generators and electrical apparatus. The gas supply is run outside of and along the entire length of the power house from the producer plant.

The Gas Engines.

The initial power equipment consists of three gas engines, two of which are shown in the illustration herewith, the third not being yet installed. Each of these is of 1000 kw. capacity and consists of a twin tandem horizontal double acting Allis-Chalmers gas engine direct connected to a 405-volt, 25-cycle alternator built by the same company. Although the rating of each unit is given as 1000 kw., both engine and generator were designed with large overload capacities, the engine being capable of developing upward of 2000 hp., and the generator having a corresponding capacity. Each engine has four cylinders, 32 in. in diameter by 42 in. stroke, and a rated speed of 107 rev. per min.

The valve gear is of the standard Allis-Chalmers cut-off type and the engine operates with constant compression, thus tending to insure smooth running under the highly variable loads to which it is subjected. The inlet gear is extremely simple, consisting of a main inlet valve of the single beat poppet type, eccentric operated, thus insuring long life and quiet running. The mixture of the air and gas is thoroughly effected before entering the cylinder by a patented annular mixing chamber located under the main inlet bonnet; the design and operation of this device is such that, at the instant of closing of the main inlet valve there is practically no explosive mixture left outside the cylinder. The gas valve is of the double beat poppet type controlled by a variable lift rolling lever operated by a single link connection to the main inlet gear. The life of the valve and consequently the amount of gas admitted and the time of admission is regulated by the governor. The exhaust gear is of the single beat poppet valve type, eccentric operated, and is in this respect a duplicate of the main inlet gear. A distinctive feature of the engine is the location of this exhaust bonnet with its valve at the bottom of the cylinder, where all the dirt is removed by the action of the exhaust gases, and the provision of a substantial jack to lower the entire exhaust mechanism out of place to allow inspection and regrinding of the valve. By this means the valve chamber, with the valve and its entire operating mechanism complete, may be swung out to one side, where it can be reached by the crane hoist. The removal of one pin, either in the inlet or exhaust mechanism, is all that is necessary to allow the removal of either the inlet or exhaust bonnets, with their valves and entire operating mechanism, without disturbing any adjustment whatever.

The igniters are electrically controlled and so arranged that the time of ignition may be regulated by a single hand wheel. Direct current at 60 volts is used in the ignition system. Duplicate igniters are provided at each end of the cylinder to insure prompt firing of low heat value gases and also to avoid the danger of shut down due to short circuit. The entire ignition system, from the motor generator set which furnishes the current to the electrically operated igniters, is designed with extreme care to make its action positive.

The air starting device consists of a small poppet inlet air valve at each end of each cylinder, with a main distributing valve operated by the layshaft. Air is admitted to each cylinder in turn at what would be the explosion stroke. As the high compression carried prevents the engine from stopping on the dead center, this arrangement insures the prompt starting of even a tandem engine without the use of a barring gear. The Port Washington engines being twin tandem will, of course, start from any position.

Simplicity of design, solidity of construction and quiet operation are features claimed for these engines. They are exceptionally heavy and rigid, the weight being concentrated in the frame cylinders and tie pieces in the direct line of stresses to which an engine of this type is subjected. In the design of the engine frame the difference between American and European practice in gas engine construction is illustrated. This design provides a side crank in place of the double throw crank, which is the standard practice abroad. Although the stresses admitted to the side frame in a side crank gas engine are very great they are not more severe, even in the largest sized units, than have been successfully taken care of in steam engine practice. The jaw, which is subject to a particularly severe stress, is so formed as to insure maximum strength of the casting and is reinforced by two steel tie bolts carried above the shaft, which are of sufficient size to sustain their proportion of the load without appreciable elongation. This construction entirely eliminates any bending stress in the frame at this point. Subjected as they are, at the present time, to an extremely variable load swinging from ½ underload to 50 per cent. overload, with momentary peaks greatly in excess of this, the engines handle these varying conditions with practically the same freedom from vibration that characterize their operation under normal conditions.

All wearing surfaces, including the main bearings, slides, crank and crosshead pins are arrangged for a continuous oiling system; the cylinders are lubricated by carefully timed admission of cylinder oil injected by Richardson sight feed oil pumps. Water for the cooling sys-

tem, which includes ample provision for cooling the cylinder walls, cylinder heads, piston, rods, exhaust valves and bonnets, is circulated by means of two Norris and two Deming pumps, each driven by an induction motor.

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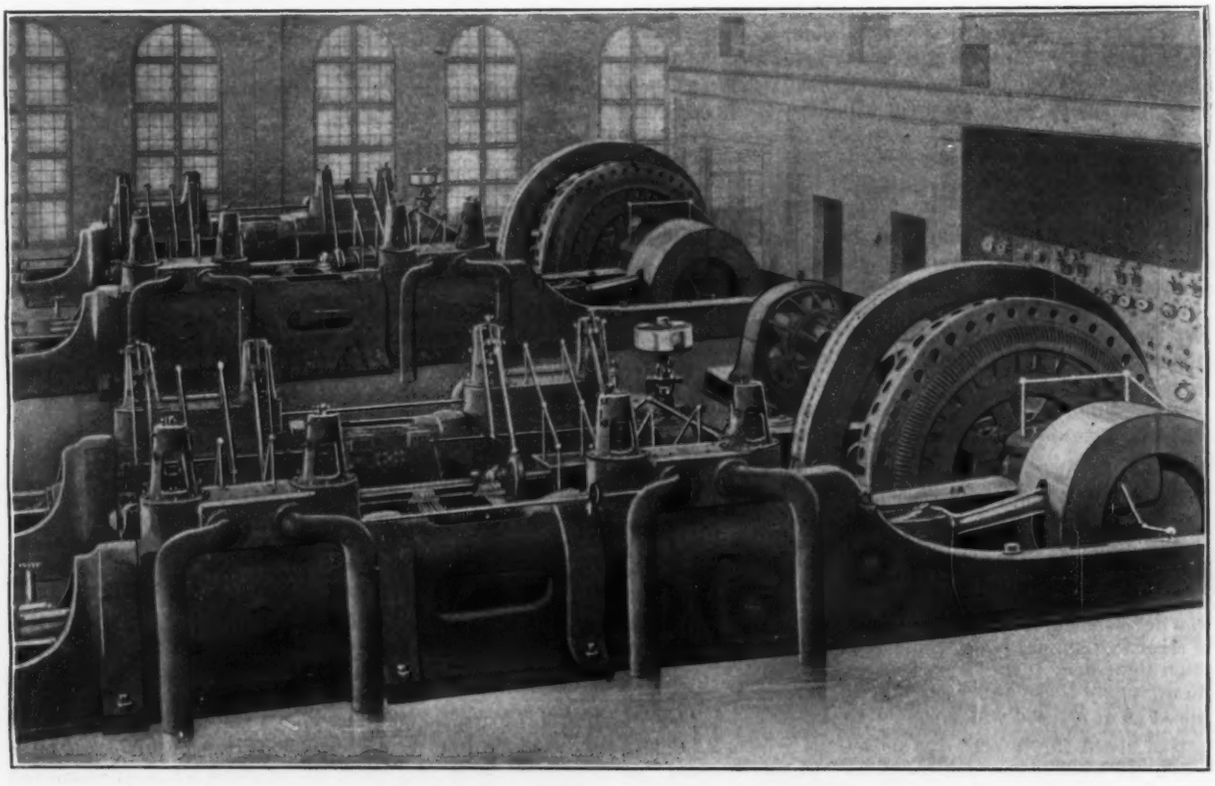
Electrical and Other Equipment.

The electrical equipment consists of a three phase alternating current generator of 1000 kw. normal capacity, direct connected to each engine unit, and delivers current at 405 volts and 3000 alternations. The revolving fields are of special construction having sold cast steel field poles bolted to a heavy cast iron spider; they are, therefore, easily removed when necessary to get at the field coil. These generators are designed to deliver their rated output of 1000 kw. continually at 90 per cent. power factor, with a rise in temperature not exceeding 35 degrees C.; and with 50 per cent. greater current for two hours following a full load run, a temperature rise not exceeding 50 degrees C.

The greater part of the road's equipment, including all of its power and electric machinery was built by the Allis-Chalmers Company. Auxiliary apparatus furnished by other concerns include a coal handling plant supplied by the Industrial Works, Bay City, Mich.; power house and car repair shop built by the Whiting Foundry Equipment Company, Harvey, Ill.; oil filters from the factory of the Van Dyck-Churchill Company, New York City; trucks constructed by the American Locomotive Company, Schenectady, N. Y., and the New York Car & Truck Company, Kingston, N. Y., and shop machinery from the Niles-Bement-Pond Company, New York City.



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Replying in London *Engineering* to some criticisms on the economy and reliability of large gas engines, Ehrhardt & Sehmer, Schleifmühle, Germany, say: "There is no doubt that the four cycle, two cylinder tandem engine, as built here, is just as much to be relied upon as the best modern steam engine. As far as 'getatableness' is concerned, your readers may be interested to hear that our engines can be, and are, thoroughly cleaned and inspected—*i. e.*, pistons taken out, cylinders cleaned, valves removed, &c.—in a day. The bugbear of grinding in exhaust valves exists only in imagination, as this is not necessary from one year's end to another. There are no three or six cylinder engines built over here." In the same connection the following quotation is made from a paper prepared recently by Fritz Sellge, manager of the Differdingen Iron & Steel Works: "In November, 1905, our coal consumption under boilers was 5300 tons; the iron production, 21,400 tons; of this, 70 to 80 per cent. was converted into steel and rolled in the mills to partly or wholly manufactured material, and about 20 per cent. was turned out as billets. After our gas engine plant was completed, the coal consumption steadily declined, and to-day is only about 500 tons per month, whereas the iron production amounts to 30,000 tons, this iron being still further manufactured as before. The coal costs 18 marks per ton delivered, so that the saving can easily be determined. Besides the money saved here, the expense of unloading, firing and attending to the boilers is also very largely diminished."

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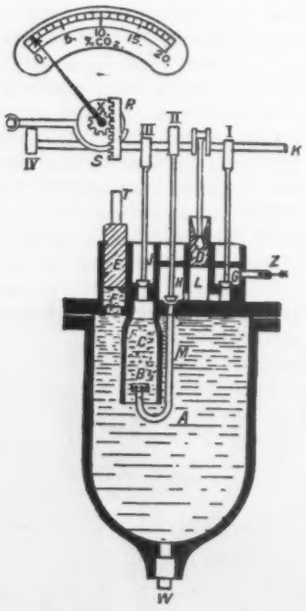

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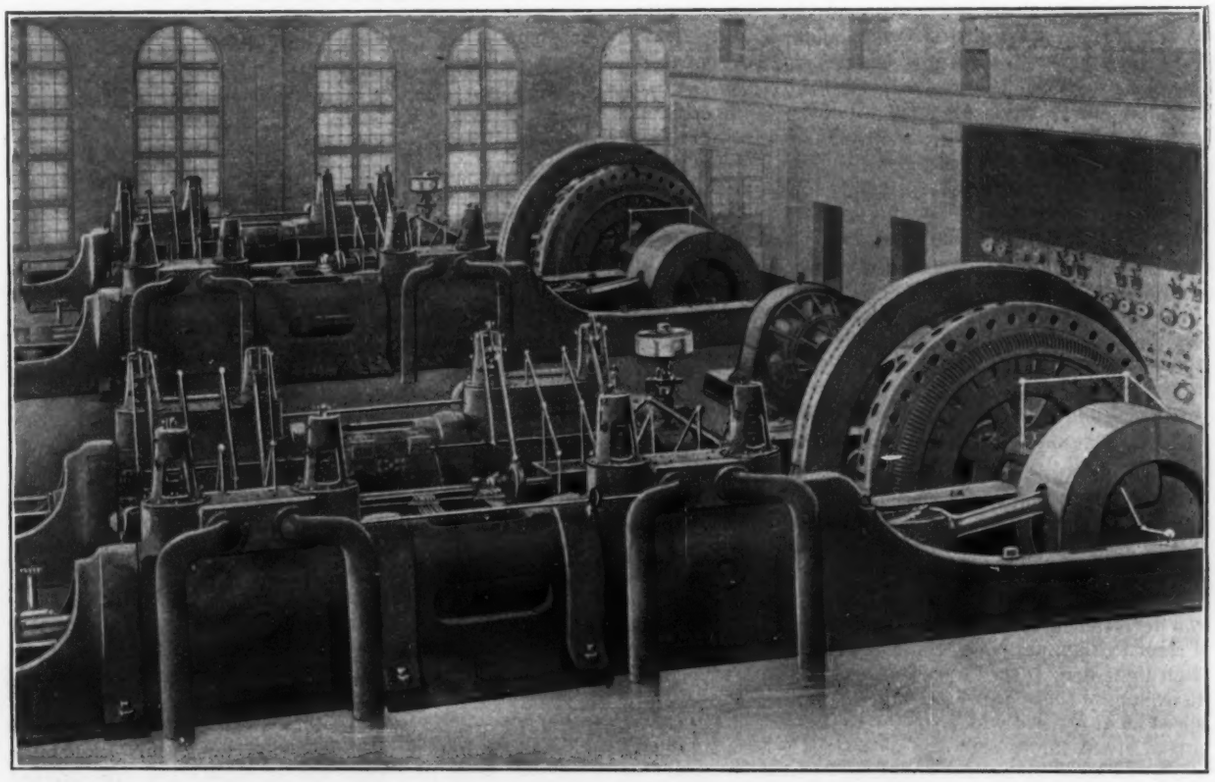

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The Positive Driving System for Automobiles.

The Principal Causes of Automobile Accidents and the Means for Reducing Their Frequency.

BY M. C. KRARUP, NEW YORK.

Attempts to check the frequency of accidents in which automobiles play a part have been so singularly unsuccessful that one may doubt if their principal cause has been discovered. Usually, excessive speed is considered the root of the evil, because relatively high speed is the most conspicuous characteristic by which automobile traffic differs from other traffic on the highways, and because it is self-evident that extremely low speed would make accidents less probable.

Together with many other features in the life centering in the automobile, the liability to accident is commonly taken at its face value and looked upon as a natural outgrowth of the automobile principle. From the standpoint of the general public, this view means an indictment of automobiles and their users, while from the other side it means, as frequently said in published interviews, that the public "must adapt itself to the new conditions." As the increased mortality from accident is no less pronounced among those who use automobiles than among pedestrians, this view is not always considered unreasonable, its holders accepting the supposition that eventually caution, and thereby avoidance of fatalities, will be learned on both sides. But, unfortunately, the facts of record do not confirm this supposition. Though the dominant type of automobile has been practically unchanged for the past five years, and the public as well as the user has had ample time to become accustomed to its peculiarities, the accidents continue to multiply, and at the same time a widespread contempt for legally enacted speed regulations is reflected in the columns of every journal commenting upon automobile affairs.

Speed No Measure of Danger.

The difficulties in basing traffic regulation upon speed restriction are many and are becoming gradually understood. A legal speed limit sufficiently low to insure safety destroys the purpose and value of automobiles to an extent which is not tolerated by those who can see that the future depends, for improvements of traffic, upon the development of mechanical locomotion and not upon a return to animal power; and it cannot be enforced. A high limit does little to prevent accident and even tends to exculpate those guilty of inflicting injury at moderate speed or at a speed which cannot be determined. Against mixed speed limits both the objections referred to hold good. In some States and countries "excessive speed" is prohibited—a term upon the meaning of which no agreement can be reached. Those who would justify a speed of 30 to 40 miles per hour on the open highway, by the infrequency of "obstacles," seem to leave out of consideration the suddenness with which an obstacle, and often a human obstacle, may at times appear. The desired adaptation to new conditions seems decidedly one-sided in a sudden encounter of this kind, and poetic justice receives its tribute only when two automobiles meet at a turn in the road or when the obstacle unexpectedly encountered happens to be a rapidly moving locomotive.

Not only does disagreement with regard to what constitutes excessive speed under different external circumstances render legal speed regulation on this basis ineffective for preventing accidents. The fact that danger from high speed may be reduced to a small fraction of what it usually is, by high skill and intense watchfulness on the part of the driver, and that, on the other hand, it may be increased almost infinitely by a temperament prone to confusion in emergencies, or by the influence of alcohol, by engrossing emotions or by simple preoccupation of the driver's mind, accounts very largely for the contempt in which any law is held that prescribes certain speed limits; or even a law according to which it is assumed that judge or jury may determine from a known set of external circumstances whether a certain speed known to have been maintained was permissible or not.

Realizing the absurdity of measuring responsibility, civil and criminal, by a speed yard, so long as a yard of speed may mean anywhere from an ounce to a ton of real danger or real recklessness, one begins to look for other causes of the insecurity of automobile traffic; causes which, while less obvious, should show themselves more fundamental than high speed by a closer correspondence between cause and effect.

The Traffic Regulation in France.

In the search for these more fundamental causes it is not always forgotten that high speed in itself at present constitutes an offense against the slower moving members of the general traffic by disturbing that tranquillity which is rightly considered one of the boons of civilization and entitled to protection, but it is maintained that when the infliction of actual bodily injury ceases to be common the sense of security, wherein tranquillity consists, will follow security, whether the latter is obtained by speed reduction or by other means. Meanwhile, "adaptation to new conditions" must consist in the temporary sacrifice of tranquillity, while the modern problem of reconciling high speed traffic with safety is being worked out. This logic lies behind the methods adopted in France for safeguarding the traffic; speed being practically unrestricted, while severe sentences are meted out to those who by causing accidents show themselves unfit for driving automobiles, whether the reason for their unfitness be shortcomings in skill, in temperament or in character. The license card which every driver (owners included) must carry receives an annotation of every accident of which he becomes a party anywhere in France, and whether he is held culpable or not, and in case of repetition he finds it exceedingly difficult to get the most plausible explanations of innocence accepted.

In aiming to stamp out insecurity, France thus recognizes that speed in itself is not the most fundamental cause of danger, but is largely neutralized by mental factors, which in the average person assert themselves with an intensity that grows with the speed. By trying out the skill of those who would be licensed to drive, and eliminating by substantial punishment those whose personal characteristics constitute a danger in the traffic, her authorities seek to establish a safe *modus vivendi* on a basis of facts of record rather than on a preconceived theory to the effect that high speed is the one feature to be suppressed. The automobile traffic in France is thus both speedier and safer than in other countries, though not yet safe enough. Reprehensible accidents are greatly reduced in number, but blameless accidents are still common, and sentences are frequently imposed which seem excessively severe.

Dangers Due to Violation of Natural Laws.

Are there, then, factors still more fundamental in determining the safety of traffic than skill, temperament, character and habits of the drivers? Laws aiming to regulate these factors must assume certain average standards, above which the law can ask no more and ceases to be applicable. With full justice such laws can be brought to bear only against a small minority of drivers, unless in reality automobiles should be condemned as unfit to be driven by the average person. By this reasoning one finally reaches to the automobile itself—though not the automobile principle—as the possible cause of unsafety. There may be factors of unsafety in automobiles which apply in equal degree to all drivers; there may be physiological laws operative in all human beings which interfere with the safe operation of automobiles, as automobiles are usually constituted. That would be more fundamental. Any form of traffic regulation ignoring an always existing conflict with an inexorable natural law, even if that law relates to something so intricate as the

relations between mental and physical mechanism, would never be likely to give wholly satisfactory results.

The logic of the situation compels a search in this direction for a new, hitherto unrecognized and strong factor of unsafety; for some restriction which nature, mental and physical, places upon the use of automatic machinery for locomotion before such use may be considered safe in traffic of the highways, but which is not observed in the automobile.

How "Innocent Accide ts" Take Place.

Clues are so plentiful that one starts by wondering that they have not been followed. It is generally conceded and in itself evident that the dangers of speed are neutralized as much as possible only when the condition of the driver's mind is expressed in such terms as watchfulness, unremitting attention, readiness to observe and readiness to act in accordance with the observations. It is also an uncontradicted fact that where the high pressure of difficult external conditions, such as in congested city traffic, enforces unceasing watchfulness, there speed is of itself reduced, and, though it remain relatively high, accidents very seldom take place, though just there the danger appears to be greatest, and there the so-called narrow escapes—which in dense traffic are virtually little more than optical delusions—are most frequent. And it is known that under these circumstances the driver is in unceasing rapport with his clutch and brake pedal. The real accidents take place where the street or road seems clear, and when an unexpected occurrence happens to coincide with a slip in the driver's attention—speaking of those cases only which cannot be charged directly to lack of ordinary skill, faulty condition of the vehicle or objectionable personal characteristics of the driver. These may be taken care of by preventive and punitive legislation, as in France.

Slips in attention! Legislation may prevent positive wrongdoing in a measure. It may check gross carelessness, but can it make weak average men infallibly and minutely attentive, unless it does what close city traffic does automatically where most congested—namely, reminding the driver unceasingly by an uninterrupted and everchanging succession of appeals directly to his senses? To this string of forcible reminders he responds by keeping his foot on the speed reduction pedal, acting or full ready for action till the street clears and the reminders cease.

The Vigilance of a Normal Person.

Attention, as an attitude of the mind, was formerly considered mostly depending upon volition, but the modern schoolmaster or psychologist knows that it depends on facts, mostly external facts, and must be a spontaneous result of these. Moreover, all know that monotony dulls attention, and physiologists know it as a law that sensations—meaning impressions upon the senses of man—must be continuously varied in some manner or degree in order to reach consciousness continuously. They know it to be the heart and essence of mentality to crave constantly fresh associations, and that the normal mind invariably wanders from a sensation which is unchanging. But to those not familiar with the uncompromising nature of this law it may be difficult to become fully convinced that no man or statute law can set it aside, and it may therefore be left to authorities in mental science to pronounce upon the somewhat abstruse application of this natural law to the case which arises when the automatic automobile rolls monotonously forward without any organic connection between its motion and the driver's body or volition, and without apparently demanding any other attention than a slight steering movement which has become second nature.

There seems little need for scientific data, however, for reaching the belief that the attention of any normal person under these circumstances is likely to flag and to drift more or less to other subjects than the apparently wholly satisfactory speed of the car. In fact, it seems that the more mentality he possesses the more it will be likely to drift, and then, when the unexpected happens, the question is not how law-abiding he is, but how far he has been taken away from readiness to act with regard to the speed of his vehicle.

Conditions for Safety and Means of Control.

Now the clues already point directly to one fruitful cause of accidents and to the means for preventing their frequency. Safety demands that the driver's attention shall be kept keyed up to complete responsiveness to anything that may happen, and the natural laws of mental mechanism declare that attention can be so kept up only by a constant receipt of sense impressions related to the movements of the vehicle. Such a continuous interaction between the driver and his work is now mechanically established with regard to the proper direction of an automobile, through the fact that the latitude for deviation to the sides is so very small that the hands of the driver are compelled to rest upon or grasp the steering wheel continuously; and in very close traffic the driver temporarily establishes a similar interaction with regard to speed by keeping his foot responsively on the clutch pedal, as before referred to, overcoming the resistance of the clutch spring more or less, according to the speed requirements. But when the clutch is set, the spring resistance ceases and the interaction disappears. Thereafter, as long as the road seems fairly clear, the speed of the vehicle is influenced only by the road conditions and by intermittent, purpose determined acts of the driver. That this is so is wholly a matter of a design feature thoughtlessly copied from locomotive, steamship and stationary engine practice long ago, when automobiles were in their infancy and no adequate thought had been given to questions of the safety of the general traffic.

If Steering Were Intermittent.

Nothing probably illustrates the value of continuity in control as strikingly as would a car that was steered intermittently, on the plan actually adopted for speed control. Imagine it running while the driver sits perfectly idle. Suddenly something appears in the car's path, and the driver quickly grasps the steering wheel, turns it just enough to avoid a collision or the ditch, then lets go of the wheel again until another mishap threatens, grasps it again for a moment, and so on! Ruts and roughness in the road he disregards because it is too much trouble to grasp the wheel when not positively necessary for avoiding damage. The course of a car on this plan of intermittent control of its direction would be a zig-zag line with sharp turns, and it is readily perceived that the safety would not be great, even if the driver were unusually skillful in grasping the steering wheel just in time.

When in actual automobile practice he manages to grasp the speed levers on this plan just in time in 99 cases out of 100, his measure of success in this respect is doubtless due to the fortunate fact that the steering gear is not operated on the same principle and, therefore, does not exact a conscious effort which would distract his attention from the more difficult speed adjustment. And when in one case out of 100 or out of 1000 he fails to gauge his speed right for the avoidance of a collision, and one of those accidents takes place whose number in the aggregate is so appalling, it seems justifiable to infer that one of the principal causes is the absence of any element in his speed control compelling the same degree of uninterrupted attention that the steering gear exacts or that congested city traffic forces upon him temporarily with regard to both steering and speed.

Subconscious Effects of Intermittence.

Apart from the unavoidable physiological effect of undermining the foundations of vigilance in all drivers the present system of intermittent speed control has certain other effects toward demoralizing volition of scarcely less importance, and which may be observed on streets and roads every day. While the skillful driver instinctively steers clear of ruts and obstacles in the road, if they may be be avoided by mere steering, he does not instinctively slow up to ease the car over roughness, or at turns or crossings or in other places where unseen dangers may be anticipated. The act required for a speed change, and especially for a speed reduction, is a definite incident in driving, not an integral part of driving (except under those conditions several times referred to when the driver in close traffic feels impelled to keep

his foot responsively on the more or less slipping clutch). To cause this definite act something more definite than a fleeting impression is required. Between no action and action a physical effort must intervene, and this physical effort is not made unless the surrounding conditions render it plainly imperative.

In the case of a fleeting impression of doubt, as might be caused by something dimly seen in the road without certainty that there is really anything there, or by a sound which reaches the ear faintly without rousing conscious attention, no action is taken, partly because any action by clutch, brakes or gear change would have an effect out of all proportion to the vagueness of the sensation and to the remoteness of the chance of necessity for action, and partly because the action itself is so complicated, relatively speaking, and subject to so much choice of means (throttling with or without adjustment of the spark, slipping of clutch with or without brake effect, emergency brake, any one of several gear changes constituting the various means at command), that any subconscious impression upon the driver's mind is insufficient to overcome the mental inertia and cause the action to be taken.

Strong action is not caused by a weak impulse. Skill that has become second nature undoubtedly helps somewhat, especially in the control by throttle, which requires less initiative and physical effort than the other means, but the throttle in a gasoline car is a weak agency for retardation, having no direct effect on the car's momentum, and the degree of skill required for good results is not adapted for public regulation, because in trials of skill the very fact of being on trial stimulates consciousness temporarily, exactly as do the natural difficulties in congested traffic. In everyday driving the finer sensibilities of the driver, which all operate subconsciously, are nullified, so far as any influence upon the speed of the car is concerned, by reason of the grossness of the operating mechanism, which obeys only conscious action. When the driver hesitates the car goes ahead, though it ought to be slowed up in accordance with the hesitation, because the hesitation represents a possibility of trouble, which is a possibility of a necessity for slowing up.

Dangers of Prevailing Control System.

Summarizing, it is now clearly seen that the prevailing system of intermittent speed control involves two well defined dangers to traffic; it undermines the quality of attention or vigilance and thereby destroys readiness for suitable action in emergencies; it superinduces neglect of indefinite factors of danger and thereby, in addition, inculcates habits in driving which have the same effect as temperamental or moral recklessness would have. Both dangers are necessary results of the operation of natural laws and beyond reach by statute law.

Continuity of Speed Control Demanded.

The remedy for these dangers is, of course, much simpler than if the question were of influencing the minds of all who use automobiles by admonition or threat of punishment. What is required for safety is, first of all, the adoption of continuous speed control instead of intermittent speed control, and this is to be accomplished by incorporating in the construction of automobiles an instrumentality which, by the laws of mechanics, must be in continuous and graduated interaction with the driver's body and mind, and the effect of which must range from that of mild throttling to a severe brake effect, the latter coming into action when the device is not actuated by the driver.

Legislation to take care of incompetence and criminal inclinations need be only subsidiary.

The Principle Previously Acknowledged.

This principle of safety is acknowledged in practice when the locomotive engineer under dangerous circumstances keeps his hands cautiously on throttle and air brake, though he has no steering to attend to. In steam automobiles it might be easily incorporated by rendering it necessary for the driver to keep his hand or foot on the throttle to prevent it from closing. One well-known American car was once equipped with a foot button which shut off the gas when not depressed, but its effect was not radical enough for emergencies and the operation of it was burdensome. New developments in pedal control and commercial competition compelled its abandonment. In numerous cars the accelerator throttle must be forcibly held open to produce maximum speed, but this precaution, while an acknowledgment of the right principle, is applied only to top speeds, usually above 40 miles per hour.

A Simple Mechanical Remedy.

An extremely simple method for compelling the mentality of the driver, which constitutes the fundamental source of safety against the irresponsible machine to remain always active and to get an expression in the speed of the car of his doubts and hesitations, would consist in reversing the usual method of operating the clutch or clutches. They now grip when the driver does nothing. When the driver presses the pedal the clutch is released, cutting off the motor power from the wheels (and often throttling the motor automatically), and when he presses more, or presses another pedal at the same time, brakes are set.

By exactly the opposite action—the spring releasing the clutch, throttling and applying the brakes, when itself released—constant pressure of the driver's foot would be required for keeping the car in motion, and in case of hesitation or doubts the natural relaxation of his foot pressure would bring the spring into graduated action to slow up the car, and, if needs be, stop it. The driving operation in close traffic would be exactly similar to what it is now—a constant play of the clutch pedal—but in the open the driver would still be compelled to remain in active touch with his power. The car would automatically stop if the driver dropped dead, but this is not highly important. While alive, however, he would become a real driver, rather than the watchman of an automatic, self-moving machine.

Drivers probably would not like this expedient at first, but by complying with the natural physiological conditions for insuring watchfulness in drivers, it would save speed from most of its dangers, besides contributing to the driver's voluntary reduction of speed to reasonable limits. A few thousand lives would be saved and many drivers' lives among them.

More Than One Remedy at Command.

Mechanically, the reversal of the clutch mechanism would be nothing more radical than a step in an evolution; a step rendered possible by the advance in clutch construction now permitting the clutch to be operated frequently without risk of spoiling it or of unexpected seizing or slippage. The same advance is applicable to brakes, however. The traditional objection to "braking against the motor," while still honored, no longer holds good, since it is possible to construct brakes which are quite as subtle in adding resistance as the throttle is for reducing power; and the reversal of the clutch is therefore not the only means at command. The instrumentality for securing the safety of traffic may be a finely graduated brake, compounded with the clutch only in such manner as to secure against accidental stalling of the motor, but capable before the action interferes with clutch and throttle, of retarding the momentum of a fast moving car considerably whenever the pressure of the driver's foot upon the brake is reduced. This would obviate frequent low throttling of the engine, which is now a refractory cause of irregular lubrication and the consequent emission of blue smoke, constituting a nuisance in the traffic.

Involving no mechanical difficulties and less restriction than any other plan for safeguarding the traffic, the Positive Driving System, as here proposed, or in some other form, giving control by hand rather than by the foot, would probably long ago have been fully recognized in practice were it not that competition absolutely prevents any one manufacturer from embodying the principle in his product until other manufacturers are required by law to do likewise, the law also serving to protect the system against any interference by means of ratchet stops and similar devices to which the unscrupulous might resort.

The Cincinnati Pig Iron Trade in 1907.

BY JAMES A. GREEN.

Business these last few weeks in pig iron offices has been so insufferably dull that the clerks amused themselves one day in writing limericks. As models of poetry their work deserves no commendation, but as describing the events of 1907 they do it so concisely that little is left to be desired. The limericks were all along the lines of the two that follow:

When the year began we were feeling fine,
Eating lobsters and drinking wine.
Oh! Isn't it strange
How quick things change?
Now it's corn beef and cabbage for mine.

Pig Iron was a prince of high degree,
And he was IT most certainly;
But too soon, alas!
It came to pass
That a pauper he found himself to be.

Another resort to pass the time was the making of a fake calendar, as follows:

January—Feeling out of sight.
February—All sold up.
March—Nothing can hurt us this year. We have got things cinched.
April—My! What a month! Everything coming our way!
May—No iron left for anybody.
June—It is funny, the buyer is a little quiet.
July—Oh, well, this was vacation month, and what could you expect?
August—It feels as if somebody were hitting us in the back.
September—Hello! A change is coming over the spirit of our dreams.
October—Panic.
November—Where are we at, anyhow? Who threw that brick?
December—Requiescat in pace.

Now that the year has passed and gone, it seems almost impossible that we could have felt in the early months of the year such an overwhelming confidence in the situation. In January, Southern No. 2 Foundry was selling for immediate shipment at $23, Birmingham, and Northern was bringing $24 at furnace. Prices have now receded so that No. 2 Foundry has been sold at $14, Birmingham, and less than $17 has been made on Northern iron.

How the Year Opened and Closed.

The progress of the iron trade in the opening months of the year was like the progress of a victorious army with banners, and now that same victorious army, panic-stricken, is in dire retreat, banners draggled in the mire, and gloom and disaster on every countenance.

Of course the year has been a grievous disappointment. It has not ended well, and its happy beginning is all but forgotten in the calamity of its finish. There is one consolation to be found in the situation, however, and that is, provided it is any consolation, pig iron itself is not to blame. The ironmasters of the country did not precipitate the trouble. While prices were high, yet at no time did the excessive prices quotable on spot iron represent anything like the prices which consumers were paying for the bulk of their iron. The greater part of Southern iron delivered during the first nine months of the year was sold on long time contracts at $18, Birmingham, and the Northern iron ranged from $18 to $20, at furnace. Considering the general market, these figures were not particularly out of line, nor did they work any serious hardship on consumers. Of course there were individual cases where melters of iron did not cover themselves by contract and depended for their supplies on orders they were able to pick up from time to time. These men, undoubtedly, were severely handicapped. Against instances of this kind, however, it must be remembered that the furnaces had a large amount of iron sold as low at $14, Birmingham, and the Northern furnaces very considerable quantities of iron as low at $16, which they carried over into 1907 and which they delivered at these prices. So it may be safely said that as a rule consumers were not in a position to complain regarding the cost of their iron. Pig iron to the consumer was not at the prohibitive price which throttled business.

Not only that, but general business was excellent. Most melters of iron can look to the first nine months of 1907 as one of the most profitable periods in their career. And the odd part of it in retrospect is that the prosperity we were all enjoying seemed on such a permanent and substantial footing. The crops were good; there was peace at home and abroad; no great political questions were disturbing men's minds; and if ever our tremendous industrial development sailed before a fair wind, with sunny skies and a safe harbor in prospect, it was in the past year. There were scores of consumers who felt that, like Job, they would have to tear down their barns and build greater. They had all they could do, and they saw ahead of them more and more.

Conservatism at the Hight of Activity.

Producers of iron were perfectly tranquil. They were running at the maximum rate and getting prices that left little to be desired. Their order books were full to the end of the year. Yet in spite of the general feeling of confidence it was odd that there was no buying ahead for 1908. That was the one real tangible evidence in August, when usually a considerable quantity of iron is bought for delivery in the coming year, that the surface indications were not all they seemed to be.

Buyers talked of their excellent trade, and that things were certainly going to continue well with them, but they hesitated to obligate themselves for the future. Some decided effort was made to sell iron for 1908, but even when inducements were offered in the way of lower than the ruling prices the trade refused to purchase and persisted in waiting. And so when the slump came it found furnaces with order books free for the future.

There never was before just such a state of affairs as now exists in the iron business. Heretofore, when there has been a decline in prices it usually has been a more gradual affair. But this came in a night like a sudden killing frost in September. In the process of declines in other years furnace and consumers' yards alike have been well filled with iron. When previous declines occurred, the cost of manufacture has had time to adjust itself gradually to a falling market, so that furnaces have been able to keep on running even if the margin between the cost of making and the selling price was dangerously close. But on this occasion costs were at the top. There was never a year before when costs were so high, and when even with high prices the furnaces did not have as large a profit as was supposed. Ore and coke were both at the top and labor was being paid at the utmost rate. Not only was labor being paid very high wages, but it is the universal testimony that the efficiency of labor was at its lowest ebb.

Inefficiency of Labor.

It seems to be an economic law that the more labor is paid the less it produces. As an example, an ironmaster in Virginia operating an old-fashioned stack, said that in the former days of struggle and adversity, when he only paid his men a fraction of what they received in 1907, three men easily did a certain task where in 1907 six men were needed, and the six grumbled that they were overworked.

Another instance of the absolute working of this law is found in a Virginia ore mine where in November the miners suffered a reduction not only of 15 per cent. in their wages, but in the number of men in the mine, and yet, strange to say, the output of the mine at once increased. Of course the miners immediately felt that they must work, that there would be a survival of the fittest, and only the best men would be retained, hence they strove to do their best.

A prominent ironmaster in Birmingham figures that labor in the South in 1907 was getting from $2.50 to $3 for the same work that was furnished in 1900 for $1. Labor has constantly been insistent in its demands for more money. Higher wages have been paid right along, there having been three advances in the South in the last three years. Each advance has made labor more in-

dependent and less efficient. The average laborer has not made more than half time. In other words, at the mines and furnaces there have been of late twice as many names on the books as there should have been. A man working three days and stopping three days has but little heart in his work. He loses touch. The constant uncertainty regarding labor has been extremely trying. The Birmingham iron men for two years have never been sure from day to day that they had full shifts. And this has made the expense of management and supervision excessive. And in the South the shortage of labor has been pronounced, not because of a lack of men, but because of a lack of willingness to work. And while these hard times are a grievous burden, yet in one way they are a distinct relief, as they will make labor a tolerably certain quantity.

The Decline Came Like a Stroke of Paralysis.

But I started out to say that this decline in prices was so sudden that it was like a stroke of paralysis. Business simply stopped. Without warning the price of iron sank below the cost of production. And money was so tight that it was impossible to keep furnaces in operation on the indefinite hope that things would soon be better. Consequently, there was such a sudden and simultaneous shutting down of furnaces as the country has never before seen. And they went out with no iron on their yards. Consumers are in precisely the same condition. There is in America to-day no great reserve stock of iron on which to draw.

It is the intention of makers of iron not to pile any surplus output on the yards. They are going to stay out until the demand springs into life again. And of course since the panic began there has commenced the slow process of the readjustment of wages and costs, so as to get the expense of making iron down to a point where it will harmonize with the changed condition in the trade.

It may be accepted as a fact that the days of very cheap iron have gone forever. To tell the truth, it is questionable if iron was ever produced on quite as low a basis as is generally believed. There are many tales of iron being made at $6 per ton f.o.b., Birmingham, but in all probability bookkeeping details of the iron made in 1893, which was said to have been that cheaply produced, were not complete and various items of large expense were omitted. Yet in those earlier days the makers of iron were favored with ores that cost much less to get out than now and everything was on a cheaper basis. There is not the slightest prospect of ever again matching the genuine records for cheap iron that were made in 1893, 1894 and 1895. In those years an immense amount of raw material was used up without any adequate return. Many companies did business for the mere pleasure of doing it. A juster estimate is now placed upon the value of raw materials, and they will not again be long sacrificed in a fruitless effort to simply keep things moving.

And on this occasion, while the plants most favorably situated to make cheap iron will naturally profit by such a situation, yet it is not to be anticipated that reckless competition will consume, without gain to the owners, ore and coal that can be made profitable in the future by a waiting policy. So, while the prices of iron will inevitably be made cheaper by the panic of the fall of 1907, yet there is a dead line beyond which prices can hardly go.

The Most Remarkable Development of the Year.

Perhaps the most remarkable development of the year was the haste with which producers recognized changed conditions in the trade with practical unanimity in the effort to meet them. It was a very wonderful exhibition from an industrial standpoint to see the sudden cessation of activity all along the line. Furnaces were blown out by the wholesale and foundries stopped in almost the same proportion. It reminds one of a rich man who had been spending $25,000 annually on his household expenses, and who all at once realized that his income was in jeopardy and reduced his outgo to $5000.

In the iron trade itself nothing is seriously wrong. The business certainly has not been overdone. This is evident from the fact that for much of the year American furnaces were not able to take care of the local demand, and many cargoes of English iron were imported to make up the home deficiency. This foreign iron was sent as far West as Chicago, and in the early summer about half of the foundry iron used on the Atlantic coast came from abroad. And marvelous—or ridiculous as it may seem—one cargo of foreign iron was brought into New Orleans and shipped from there 350 miles by rail to Birmingham for use in a pipe foundry. This does not look as if there were too many furnaces or as if overproduction of iron could be blamed for the year's disastrous ending. On the contrary, it is the well founded opinion of the best men in the trade—and the events of this year abundantly prove it—that our consumptive capacity in good times is in excess of our productive capacity. In the South, particularly, there has been no notable increase in furnace capacity. Certainly there has been no such remarkable increase in that direction as there has been in the melting of iron.

Ten years ago about 95 per cent. of all the iron made in the South had to go north of the Ohio River to find a market. To-day more than 50 per cent. is used locally, and this percentage is bound to grow. At the time the coals were brought to Newcastle in the shape of the English pig iron shipped into Birmingham, the Southern furnaces were about 90 days behind on contract deliveries, and there appeared to be no prospect of any change in this condition for months; in fact, as late as October the furnaces generally, in the North as well as in the South, were not up on orders. They were all behind, but so rapidly did consumers request shipments held that within 30 days the furnaces did not know where to ship. In this connection the word "request" is a mild term. Most of them simply said that if any more iron was shipped they could not pay for it. Or they were even more peremptory, and said that if iron was shipped they could not receive it, and it would necessarily stay on railroad tracks accumulating demurrage. Perhaps extracts from some letters on the subject may be interesting. I quote as follows:

"We are so full of iron that we shall have to ask you to hold back shipments for the present. The two cars you shipped a month ago are still on hand."

"At the present time we are closed down for inventorying and have a goodly supply of iron on our yard. We expect to resume operations next month, but until then we must ask you not to ship us another pound of iron."

"Do not ship us any more Southern iron and not more than one car per week of Northern until further notice. We simply cannot use it."

"In answer to your favor of the 20th asking for shipping instructions, will say that we are not as yet ready for the pig iron and cannot give you the exact date when we will be. Don't ship anything more under any circumstances."

"We purchased an over supply of this iron and we do not think the furnace should be too insistent on our taking in the balance at the present time. When we find we are in position to accept some more we will advise you."

"We have been closed down since early in October for the purpose of taking inventory, and later we concluded in view of the disturbed conditions of the financial world to remain closed until they should change for the better. We cannot say just now when we will resume operating, and as we have plenty of iron on our yards to take cars of our wants for some time after we resume operating, we do not want any further shipments made."

"While expressing our appreciation of the accommodation extended to us in holding up shipments, we find it absolutely necessary for us to ask you to extend the accommodation for a still further period. We might write several pages as to our reasons for this request, but we think it will suffice to say that business is not looking at all good and we are curtailing our output in every way possible. We are only running every other day, and have a large stock of iron on hand. Hope we can advise you soon to resume shipments, but please don't send us any more until we do."

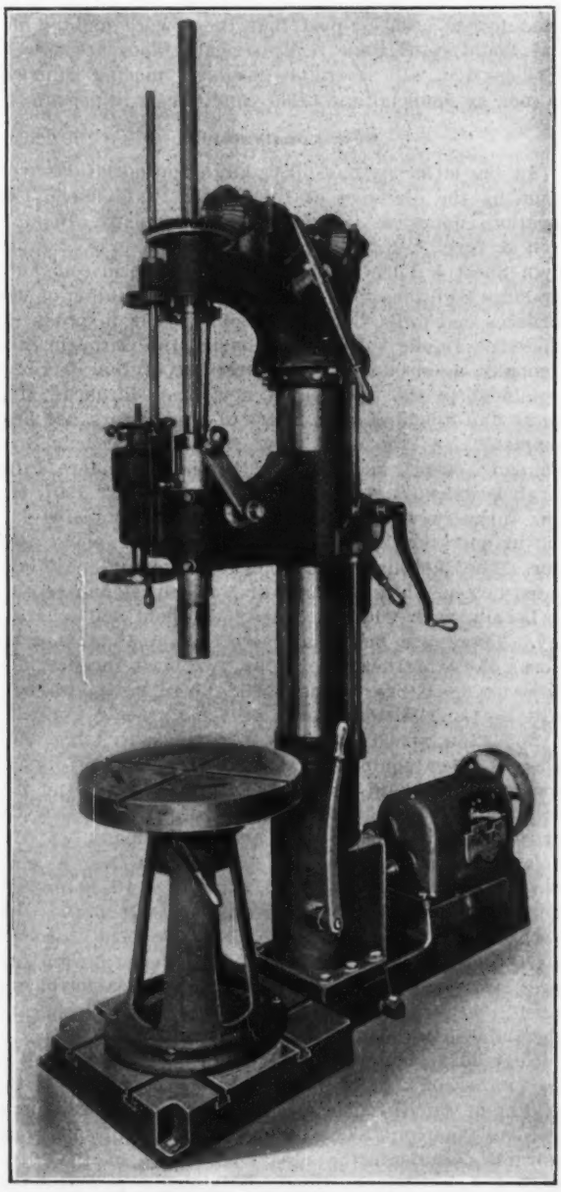
Yet no explanations were necessary. The furnaces understood. The industries of the country and the financial institutions of the country stand or fall together. They are like the dominoes that children stand on end in a row, and when the first one is knocked over the others fall, too. Banks stopping credit stopped the foundries; they in turn stopped the furnaces; the latter have stopped many coke ovens and have curtailed the output of ore and coal mines, so that at the present writing the

great iron trade and its allied branches are not quite but partially in a state of suspended animation.

Yet, fundamentally, the trade is sound. And it is in better condition than it ever was before in a period of depression to recover quickly.

The New National 24-in. Drill Press.

One of the most striking features of originality of the new 24-in. upright drill, built by the National Machine Tool Company, Cincinnati, Ohio, is the absence of back supports and top braces. These, as might be judged from the illustration, are not needed because of the liberal



The New 24-In. Upright Drill Built by the National Machine Tool Company, Cincinnati, Ohio.

proportions of the parts and the distribution of the metal where it is most effective in affording rigidity and strength. A similarity between this machine and a radial drill is the provision for revolving the head around the column, which is advantageous when drilling heavy work, and in connection with the revolving table makes is possible to drill holes on any part of the table. The stump or column is 8 in. in diameter, and has a bearing two-thirds the hight of the sleeve which surrounds it. The sleeve fits this stump and revolves on roller bearings, carrying with it the drill head and the driving mechanism at the top. An important advantage gained by the design of the machine is the ability to use an exceptionally large crown gear 9¼ in. in diameter.

The sliding head and the spindle are counterbalanced and are raised and lowered by means of a crank, pinion and screw. The back gears are located in the base of the column and are so arranged that they may be engaged or disengaged while the machine is running. The change gears in the speed box, through which a variable driving speed is obtained from a constant speed driving pulley, are also capable of being manipulated without stopping the machine. The six changes possible are made from any one to any other by sliding a double tumbler gear and dropping it into the desired combination. The range of speed obtained through the speed box is doubled by the back gears making a total of 12 speeds, which are so selected as to give proper spindle speeds for all drills from ½ to 2½ in. in diameter. Directly behind the back gears is located the tapping attachment, where it insures the greatest power, and the controlling lever for stopping, starting and reversing the machine is situated immediately under the hand of the operator.

The transmission of the spindle drive and feed from the top of the machine is apparent in the engraving. Four changes of geared feed are provided in a gear box, which is a part of the head. All of these changes can be made instantly while the machine is in operation. The feeds per revolution of the spindle are 0.008, 0.012, 0.016 and 0.02 in., and the spindle speeds are 36, 43, 51, 61, 75 and 94 rev. per min., with the back gears, and 107, 123, 144, 171, 210 and 267 rev. per min., without the back gears, the ratio of the back gears being 2.8 to 1. These speeds correspond to a driving pulley speed of 360 rev per min. The quick return and approach lever, located near the top of the column, also engages and disengages the feed, so that it is only necessary to use one hand for all of these operations. The diameter of the spindle above its sleeve is 1 11-16 in. and in the sleeve 1 13-16 in. The spindle is fitted with a No. 4 Morse taper socket and has a traverse of 11 in. The traverse of the head on the column is 23 in.

Any style of table can be provided. The one illustrated is made very rigid and stiff by being supported directly from beneath, and insures the retention of the original alignment at all times. As before stated the table is revolvable to facilitate positioning of the work and it is 22 in. in diameter. When work is to be drilled directly on the base the table can readily be removed entire, and a working surface is then available of 22 x 22½ in. The greatest distance between the spindle and the base is 43 in, and between the spindle and the table 23 in. The machine occupies a floor space of 22½ x 55 in., has an over-all hight of 7 ft. 5 in., and a total weight of 2100 lb. The weight and the dimensions of the principal parts are interesting as they compare favorably with those of a much larger machine of the usual type.

Summarizing the investigation of alloys of nickel and silicon by W. Guertler and G. Tammann *Engineering* says they find five definite compounds, the proportions of Ni to Si being 2 : 1, 1 : 1, 2 : 3, 3 : 1, 3 : 2. Alloys containing from 5 to 15 per cent. of silicon can, like nickel, be forged cold, but not when at red heat. When the silicon percentage exceeds 22, the hardness of the alloy increases; a regulus with 25 per cent. of Si cleaves like mica in sheets, and alloys containing more than 50 per cent. of Si can be powdered. It is interesting that an alloy containing 20 per cent. of silicon is much harder when slowly cooled than when suddenly chilled; with higher percentages of silicon this peculiar behavior of silicon, which in this respect differs from carbon, becomes less marked.

The report of the Alabama Car Service Association for the month of November shows a total of 57,000 cars handled as against 65,000 in the same month of the preceding year, when every maker of pig iron was doing his utmost to have the metal rushed to the impatient customers.

The Columbus Iron & Steel Company has blown out its furnaces at South Columbus, Ohio. Both stacks will remain idle until such time as the market improves.

THE PITTSBURGH IRON TRADE IN 1907.

BY ROBERT A. WALKER.

Were it possible to eliminate from a review of the Pittsburgh iron trade in 1907 the last two months of the year, it would be the pleasure of the writer to state that the year was not only one of the best, but probably the best, that the iron trade ever saw. There were signs, both financial and otherwise, of a slowing down in the steel business in September and October, but even the habitual pessimist did not conceive that the steel business could dwindle in such a short time from a demand in excess of the supply to practical stagnation. Various reasons have been set forth as to the direct causes of the financial panic and the depression in the steel business through which the country is passing, but it is not the purpose of the writer to go into details regarding these, it being sufficient to state that the one great cause of our present troubles was the impairment of confidence.

General conditions throughout the entire country could hardly have been better than in the greater part of 1907. Labor was steadily employed at high wages, consumption was going on at an enormous rate, crops were fairly large and farmers were receiving most lucrative prices ever paid for their products. It was, of course, recognized that the extraordinary prosperity in the steel business and in general trade as well, that had prevailed in this country for three years or more could not go on indefinitely, and that there would have to be a slowing up some time and a return to less strenuous conditions. A moderate shrinkage in the demand would have been welcomed by the steel trade, which for many months had been congested with orders that could not be turned out as promptly as wanted by customers. As late as August and September, our largest steel concerns were from four to six months behind in deliveries on some products, and were turning down almost daily excellent orders for which consumers were willing to pay heavy premiums. Instead of a moderate shrinkage, however, business suffered almost a complete collapse.

The financial stringency which had its inception in New York, spread westward in October and Pittsburgh was very hard hit; on the 23d of that month came the announcement of receivers for the Westinghouse Electric & Mfg. Company and the closing of the Pittsburgh Stock Exchange, which has not opened since that date. In an incredibly short space of time depositors were withdrawing their money from the banks and locking it up in safe deposit vaults and other places, and perhaps the worst monetary scarcity the country has ever known became a realization. In the last two months of the year large employers of labor could not get currency from the banks to pay their men and recourse was had to clearing house checks, most concerns being compelled to issue these checks to the extent of 80 per cent. of pay rolls, paying only 20 per cent. in cash. In the early part of December came the failure of the Fort Pitt National Bank, Pittsburgh, which was a large creditor of the embarrassed firm of Whitney, Stephenson & Co., leading stock brokers of the city. These events, with failures in other parts of the country, naturally further increased the distrust, and business and financial conditions in Pittsburgh at the close of the year were in very unsatisfactory condition. However, as it is darkest before dawn, there are already signs of coming betterment for both financial and manufacturing interests. The supply of currency is getting larger, the feeling is more cheerful, and unless there are more unfavorable developments it is believed that very early this year conditions will improve materially not only in Pittsburgh but all over the country.

In 1893, when the country passed through a similarly severe depression, the large steel interests in an endeavor to keep their plants running, set out to force their products on the market and prices were made which resulted in a number of concerns being forced to the wall. An entirely different course is being pursued in the present depression, through the leadership of the United States Steel Corporation, the policy adopted by steel manufacturers being to keep down output and prevent ruinous competition in prices. This policy has been closely adhered to, and the close of the year found a reduction in pig iron output of more than 50 per cent.; in crude steel output close to 75 per cent.; in coke production more than 50 per cent., and in finished iron and steel fully 50 per cent. It is true that prices of pig iron, scrap and coke have heavily declined, but on the other hand it has been claimed that these were unduly high and would stand some readjustment. They are now on a basis that will warrant consumers placing contracts as soon as financial and other conditions will permit.

New Construction.

In the latter part of 1906, large appropriations were made by the directors of the United States Steel Corporation, Jones & Laughlin Steel Company, Republic Iron & Steel Company, La Belle Iron Works, Youngstown Sheet & Tube Company and many local companies for large additions to old plants and the building of new furnaces and mills that would add greatly to producing capacity. In the Pittsburgh District, the Carnegie Steel Company, a subsidiary of the Steel Corporation, has been prominent in the building of new blast furnaces, steel works and finishing mills, much of which work has been completed. At the opening of 1906, the Carnegie Steel Company owned and operated in the immediate Pittsburgh District 30 blast furnaces. In the year 1907, two new furnaces at its Carrie plant were completed and put in operation, with a daily capacity of about 1200 tons. The National Tube Company, another subsidiary, added one new blast furnace at McKeesport and another at Lorain, each with a capacity of about 450 tons per day. There are now under erection at the Duquesne Works of the Carnegie Company, two blast furnaces and 18 50-ton open hearth furnaces. There have also been built at the Clairton Works of the Carnegie Company 14 and 22-in. structural mills, together with large additions of other equipment. At the Duquesne Works, a new 16-in. merchant bar mill has been erected, and this plant is now the largest producer of steel bars of the entire works owned by the Carnegie Company. At the same company's Homestead Works, the No. 4 open hearth department was added, containing 10 50-ton furnaces. Six open hearth furnaces were built at the Ohio Works of the same company, while two blast furnaces of 450 tons daily capacity and 12 50-ton open hearth furnaces are under construction. A new and heavier blooming mill is also being installed in the Ohio Works and other additions to equipment are being made.

Next in importance to the Carnegie Steel Company in the matter of increase in producing capacity by the building of new furnaces and mills is the Jones & Laughlin Steel Company. This company has acquired a very desirable manufacturing site at Aliquippa, on the Pittsburgh & Lake Erie Railroad, containing over 800 acres, and made plans for the building there of four blast furnaces, six Talbot open hearth furnaces, and blooming rail, structural and plate mills. Work on three of the blast furnaces was started in the summer of 1907, contract for their erection having been placed with the Riter-Conley Mfg. Company of this city. The work was pushed actively until the financial stringency, when operations were slowed down considerably. At present it is the intention to finish up two of the blast furnaces, while the other new construction will be held in abeyance until times improve. The La Belle Iron Works built at Steubenville, new sheet and jobbing mills, also one open hearth furnace and made other large additions to its plant, which will materially increase its output. This company has gone steadily ahead in the extension and betterment of its plants and has plans for still more work of the same kind, definite announcement of which will be made when they are fully matured. The Youngstown Sheet & Tube Company set aside $2,000,000 early

in the year for the building of two blast furnaces, work on which is under way, and when these have been finished the building of two more will be started. This company has also added new butt and lap weld furnaces and a new plate mill and has very largely increased its capacity for the manufacture of pipe, sheets and other products.

The American Sheet & Tin Plate Company, with its fixed policy of steadily bettering the physical condition of its plants, has made large improvements and extensions to its works at Scottdale, Vandergrift and other points, and is now able to turn out about 100,000 tons of tin mill and sheet mill products. The Pittsburgh Steel Company, with large rod and wire mills at Monessen, Pa., started work early in the year on the building of 12 50-ton open hearth furnaces, which will be making steel before the summer of 1908. This company has plans under way for the building of blast furnaces and more finishing mills, but desires to get its steel plant in operation first, and for a time will be a buyer of pig iron in the open market. Taken all in all, construction work in the Pittsburgh District in 1907 has been larger than the annual average. It would have been much larger had it not been for the financial stringency which made the securing of funds for this purpose practically impossible. A great amount of new work has been held up for which plans had been definitely made and in some cases contracts placed.

Labor Matters.

The year 1907 was practically free from labor troubles of any kind. While some little time was spent in arranging the puddling and finishing scales of the Amalgamated Association, an agreement was reached without serious trouble, and the mills of the Republic Iron & Steel Company and other concerns who sign these scales continued to work without interruption. The same was true of the sheet and tin plate scales, and during the year, up to November, labor was steadily employed and at very high wages.

With the financial panic and the slowing down of manufacturing operations, thousands of men have been laid off and more men were idle in December in all branches of trade than at any time in the last three or four years. For a time it was expected that the United States Steel Corporation through its subsidiaries' interests would make a general reduction in wages of 10 per cent., effective January 1, but it was decided not to make any reduction, and wages, for the present, at least, will remain on the same basis as they have been.

Foreign Trade.

With the falling off in domestic business, the United States Steel Corporation and other large interests that have a regular trade abroad made special efforts to increase their foreign business, with the result that their export shipments in November were the heaviest of any month in the year. A notable fact in connection with the export trade is that better prices are being obtained than was the case a year or two ago. In some lines practically as high prices are being obtained for products for export as are being secured in the domestic market. It has been the policy of the Steel Corporation since its organization to take a certain amount of export business in the belief that on the falling off in demand in this country a larger export trade could be easily obtained.

The Pig Iron Trade.—Bessemer Pig Iron.

Pig iron producing capacity in the Pittsburgh District is now much larger than ever before, there being a total of 47 furnaces within 40 miles of the heart of the city, and with an annual capacity of more than 7,000,000 tons. More than 25 per cent. of all the pig iron made in the United States is now made in this 40 mile radius.

The pig iron prices quoted in this review are all given f.o.b. furnace in the Mahoning or Shenango valley. To these prices should be added 85 cents for freight to either Pittsburgh or Cleveland up to June 1, 1907, and 90 cents from that time forward.

The range of prices on Bessemer pig iron during the year, or up to November, was much narrower than in the preceding year. In the first week in January, with a fairly active demand, it was selling on the basis of $22, Valley furnace. This price held with very little variation until April. Early in that month the Youngstown Sheet & Tube Company, which has latterly been the largest buyer of Bessemer iron in the open market, purchased 10,000 tons for June delivery at $22, and 150,000 tons for delivery over the last half of the year at $21. At the same time W. P. Snyder & Co. sold a very heavy tonnage to the Cambria Steel Company, the Sharon Steel Hoop Company, the Page Woven Wire Fence Company and other interests without naming a fixed price, the seller to charge the buyers the average monthly price f.o.b. Pittsburgh, during the life of the contract.

These sales took practically the available supply out of the market for the first half of the year and nearly all for the second half. They naturally had the effect of considerably strengthening the market, and in May Bessemer iron was selling at $23 at furnace in the early part of the month and $24 in the latter part. The price ranged from $23.25 to $23.50 from June to September, when the demand slowed down and values went off to some extent. Commencing with October, the decline in prices was rapid. During November and December there were practically no sales, only a few small lots figuring in the market and these were for spot shipment. The year closed with the price nominally $19.

In the early part of the year the United States Steel Corporation was a buyer of Bessemer iron to a moderate extent, but after April, owing to its own increased pig iron output, the corporation did not again enter the market and it is not probable that it will in the future purchase Bessemer iron unless a time of abnormal demand may make this necessary. The Cambria Steel Company has been a steady buyer of both Bessemer and basic iron, but as it started up two new blast furnaces in 1907 it is now probably in a position to supply its entire requirements. The Youngstown Sheet & Tube Company, which is a heavy consumer, buys its entire supply from furnaces in the Youngstown District, but it is also putting itself in condition to supply its own requirements.

Gray Forge Pig Iron.

The demand for gray forge iron up to September was quite active and prices ruled high. In January it was quoted on the basis of about $22 at furnace, but in March and April the demand had fallen off and the price had declined to about $21. In the latter part of April the market on gray forge was strengthened by the heavy sales of Bessemer and basic iron, and the price advanced to $22, while in June as high as $22.50 was paid. In September, in sympathy with the market for Bessemer and basic, prices on gray forge commenced to decline rapidly, and in October the market was dull at about $19.50. In November and December prices declined still further, and the year closed with Northern forge being held nominally at $17.50 at furnace, with a probability that $17 or even lower could have been done had there been any orders coming out.

Foundry Pig Iron.

As in the case of Bessemer and gray forge, the demand for foundry iron through the entire year up to September was active and prices were strong. The year opened with Northern No. 2 ruling firm at about $24 at furnace. This price held steadily with slight variations up to May, when on account of the oversold condition of the furnaces and the scarcity of foundry iron, it sold for spot shipment as high as $25.50 and even $26. However, most of the tonnage was sold on contracts at prices ranging from $22 and up to $24. In September the decline started and with a shrunken demand prices went off rapidly, and in November, Northern No. 2 could have been bought freely as low as $19 to $19.50. In December, prices declined still further and in the latter part of that month, Northern No. 2 for spot shipment sold as low as $17 at furnace.

To show the range in pig iron prices a statement of average prices, f.o.b. Pittsburgh, during the year is appended. Up to June 1, 85 cents a ton should be deducted from these prices to give the price f.o.b. Valley furnace, and after June 1, 90 cents a ton should be deducted to

show the price at furnace. Average monthly prices were as follows:

1907.	Bessemer.	Gray forge.	No. 2 foundry.
January	$22.90	$22.55	$24.75
February	22.80	21.95	24.75
March	22.85	21.75	24.85
April	22.20	21.68	24.50
May	24.16	22.75	25.50
June	24.10	23.15	25.90
July	22.35	22.70	24.30
August	22.90	21.70	23.65
September	22.40	20.90	22.15
October	22.75	19.75	20.20
November	20.65	19.25	19.25
December	19.65	18.30	18.15

Steel Billets.

Up to September the year was probably the most active in the steel billet and sheet and tin bar trades ever known. In the first half of the year and, in fact, up to about August, it was almost impossible to get prompt deliveries, and there were many times during that period when the consuming mills were compelled to shut down, waiting for steel to arrive. The output was at very high pressure and new records of production were being made, but in spite of this the mills were utterly unable to meet the enormous demand promptly.

The year opened with Bessemer billets ruling at $29.50 to $30 and open hearth from $32 to $32.50, Pittsburgh. Sheet and tin bars were about $30, and were very hard to obtain. These prices ruled firm throughout the first half of the year, but in a number of cases premiums of $1 to $2 a ton were paid on billets and bars to secure prompt shipment. The Carnegie Steel Company was a heavy buyer of billets in the first half of the year, making large purchases from the New York State Steel Company, the Alan Wood Iron & Steel Company and other Eastern concerns to apply on its Eastern contracts. The Carnegie Company was practically out of the market as a seller of steel, except on its own contracts, for the first eight months of the year.

In April and May Bessemer billets for prompt shipment sold as high as $30.50, Pittsburgh, and sheet and tin bars as high as $31. In May and June some fairly large sales of billets were made, one local interest buying 6000 tons of 4 x 4 in., deliveries being 1000 tons a month, July to December, at $29, at mill, or $29.50, Pittsburgh. In June the Carnegie Company, being much behind in deliveries, made a purchase of 10,000 tons of 2 x 2 in. and 4 x 4 in. billets from the Cambria Steel Company. In June the Carnegie Company notified its sheet and tin bar customers that the price for the quarter commencing July 1 would be $31, Pittsburgh, an advance of $1 a ton over the previous quarter. At this time the supply of steel was somewhat better, and prices were a shade easier, Bessemer billets being offered at $29 to $29.50 and open hearth $31 to $31.50. Consumers of steel were then pretty well covered by contracts, and the demand was quiet.

In August the Carnegie Company bought 3000 tons of 4 x 4 in. open hearth billets from the Alan Wood Iron & Steel Company at Conshohocken for delivery to the American Bridge Company at Pencoyd, Pa. In the latter part of August the Youngstown Sheet & Tube Company had a break down at its Bessemer plant, which took it out of the market for about three weeks.

In October the price of Bessemer billets had declined to $28 and open hearth to $29, Pittsburgh. The demand was then very dull. In the latter part of October the Columbus Works of the Carnegie Company closed down, and this was a forerunner of the depression in the steel trade which marked the last two months of the year. The closing of the Columbus Works was quickly followed by the shutting down of the company's works at Bellaire, Mingo Junction, Donora, North Sharon, and finally, the Ohio Works at Youngstown. All other plants of the Carnegie Company and other interests had been slowed down, and in the latter part of December the steel output in the Pittsburgh, Wheeling and Mahoning and Shenango Valley districts was down to less than 25 per cent. of the normal output. The situation was so serious that on October 30 a meeting of the steel interests was held in the University Club, Pittsburgh, the result of which was that prices of Bessemer and open hearth billets have since held on the basis of $28, Pittsburgh. There was practically no demand for steel in the last two months of the year.

Steel Rails.

The price of standard section steel rails was steadily maintained during the year on the basis of $28, Pittsburgh. All the rail mills were steadily employed and conditions were prosperous until about August, when, on account of the very high rates of interest asked, the railroads found they could not raise the funds necessary and withdrew from the market as buyers of rails. At this time the question of new specifications for rails was taken up, the railroads and steel rail mills appointing committees which held a number of meetings and finally new specifications were adopted by the rail mills, but have not yet been officially accepted by the railroads.

In the last four months of 1907, only a small tonnage of steel rails was placed, and the rail mills entered 1908 with less tonnage on their books than in any previous year for a long time. No additions to rail capacity were made during the year, but some enormous records for output were made by the Carnegie Steel Company both at its Edgar Thomson and Ohio mills.

Connellsville Coke.

In sympathy with the active demand and high prices ruling for pig iron in the first eight months of 1907, prices on coke were also high and both demand and output were unprecedented. In January the best grades of Connellsville furnace coke for prompt shipment were bringing $3.50 and foundry coke $4 to $4.25 a ton, at oven. The output in the Upper and Lower Connellsville regions was running at the rate of over 400,000 tons a week and coke for prompt shipment was very hard to obtain. These active conditions in the coke trade continued through most of the year, and in the summer months the output of coke in these regions was running as high as 425,000 tons per week.

In September a marked falling off took place, and prices commenced to decline. In the latter part of October it was found that the demand was much less than the output and the blowing out of ovens started at a rapid rate. At the close of the year the producers of these two regions had more than 50 per cent. of their ovens idle and the output had fallen from the high mark of 425,000 tons per week to less than 200,000 tons. Connellsville furnace coke at the close of the year was offered for prompt shipment as low as $2.25 a ton, at oven, while Mountain coke, which runs higher in sulphur than Connellsville, was being offered for prompt shipment at $2 a ton and lower.

Finished Iron and Steel.

The demand for all kinds of finished iron and steel up to September was the heaviest ever known in the history of the trade. In that month orders commenced to fall off very materially and at the close of the year there was no buying, except in small lots for spot shipment and to cover actual needs. Prices during the year were very stable, few changes occurring. In the last three months of the year, in spite of the tremendous falling off in the demand, prices were reasonably firm, due to the conservative action of large producers in shutting down mills and keeping the output down to the minimum.

The year 1907 opened with structural material on the basis of 1.70 cents for beams and channels up to 15 in. and 1.80 cents for over 15 in. This price was maintained steadily throughout the year. Plates were also unchanged in price, remaining on the basis of 1.70 cents for tank steel, ¼ in. and heavier, but in certain periods of the year, owing to shortage in supply, sheared plates sold as high as 2 cents, or at a premium of $6 a ton over the regular price.

Both black and galvanized sheets were in enormously heavy demand throughout the year. Prices on black sheets were unchanged, remaining on the basis of 2.60 cents for No. 28 throughout the entire year. There was one advance in galvanized sheets of $2 a ton, this having been made on January 24, and on the same date blue an-

nealed sheets and galvanized roofing sheets were advanced $1 a ton. In hoops and bands the demand was active until September, and prices remained unchanged on the basis of 1.60 cents for bands and 2 cents for steel hoops.

The contract price of steel bars remained firm on the basis of 1.60 cents throughout the year, but there were periods in the year up to July or August, when, on account of the enormous demand, some mills that could make reasonably prompt shipments were able to obtain as high as 1.80 cents. Iron bars ruled from 1.80 cents at the opening of the year down to 1.60 cents at the close of the year, the decline being caused by a falling off in demand and to meet the competition of steel bars.

Tin plate in the first half of the year was in exceedingly heavy demand, but trade fell off very much toward the close of the year, and in the latter part of December the American Sheet & Tin Plate Company was operating less than 20 per cent. of its actual capacity and independent mills not more than 40 to 50 per cent., if that much. The price of tin plate remained firm at $3.90 per base box throughout the entire year, on which a rebate of 5 cents a box is allowed to the large trade.

Tubular goods never before were in such demand, and early in March the National Tube Company withdrew from the market as a seller of pipe for delivery prior to June 1, and also withdrew all prices. This active condition continued up until September, when a lull started, and at the close of the year the output was down to about 50 per cent. of capacity. A great many large contracts were held up and pipe mills were entering only small orders for prompt shipment. There were two advances in pipe of one point each during the year. In spite of the serious fall in the demand the year closed with prices on steel pipe ruling firm, but on iron pipe somewhat uneven, having declined from $4 to $6 a ton. Boiler tubes were in very active demand during the year until about September, when in sympathy with other lines of finished products orders fell off materially and prices on both merchant and railroad tubes were shaded to a considerable extent.

The mills rolling finished iron and steel entered 1908 with very much less undelivered tonnage on their books than at the close of 1907, and with prospects of the future rather uncertain. It is believed, however, that if financial conditions continue to improve, there will be a recovery in the demand for iron and steel products, but it is not believed that the volume of tonnage in 1908 will be as heavy as in 1907, even considering the excessive shrinkage in the last three months of that year, from which there must be some rebound. As there is always more or less uncertainty in a Presidential year, it is not probable that this year will prove any exception.

Iron and Steel Scrap.

The movement of old material in the Pittsburgh District in the first eight months of 1907 was fairly heavy. Owing to active conditions in the steel trade the demand for melting steel scrap, old rails in short pieces and bundled sheet scrap was particularly strong, at times it being almost impossible to get prompt deliveries of these grades of scrap. The Carnegie Steel Company, La Belle Iron Works, Sharon Steel Hoop Company and Crucible Steel Company of America were quite heavy buyers in the early part of the year.

In the latter part of August the scrap trade took a change for the worse, the demand being dull and prices showing a decided downward tendency. This condition became more acute toward the close of the year, and in November and December the whole scrap trade was badly demoralized, with the lowest prices ruling that had prevailed for some years.

The year closed with heavy melting steel scrap selling at about $11 a ton, showing a decline over the highest price ruling in the year of about $8 a ton, while other grades of scrap had declined in proportion. No. 1 wrought scrap at the close of the year was weak at about $13, bundled sheet scrap had declined to $9 or less, No. 1 cast scrap was about $14, and cast iron borings were lifeless at $6 a ton or less. For purposes of comparison a table is appended showing the average monthly prices per gross ton, f.o.b. Pittsburgh, during 1907:

	Heavy steel scrap.	No. 1 wrought scrap.	Bundled sheet scrap.	Cast iron borings.	No. 1 cast scrap.
January	$18.90	$20.10	$16.70	$12.40	$20.10
February	18.06	19.44	15.75	12.12	19.75
March	18.00	19.50	16.69	14.25	21.38
April	17.75	19.50	16.60	14.25	21.25
May	18.20	18.80	16.60	13.90	21.90
June	18.37	18.75	16.60	14.25	21.75
July	17.85	18.40	16.50	13.50	21.00
August	17.50	17.20	15.25	11.50	19.50
September	17.25	17.25	14.75	13.00	19.60
October	16.95	16.90	14.40	12.35	18.90
November	14.90	15.50	12.50	9.50	16.50
December	13.00	14.25	10.30	6.50	14.25

The Buffalo & Susquehanna Iron Company.

In connection with the application of the Buffalo & Susquehanna Iron Company for the listing of $1,500,000 of 20-year 5 per cent. bonds by the New York Stock Exchange, a statement of net earnings is given for the six months ending October 31, 1907. The total was $716,479, against $775,913 for the 12 months ending April 30, 1907, or nearly double the rate in the latter period. The surplus October 31, 1907, was $1,120,408, as against $597,980 on April 30. The condensed balance sheet of October 31, 1907, is as follows:

ASSETS.

Buffalo plant, real estate, &c.		$3,713,143.26
Leaseholds in ore properties		1,190,898.38
Canal		191,102.23
Stock in coal companies		300,700.00
Accounts receivable, &c.		934,246.09
Cash		137,503.93
Ore, pig iron, &c., on hand		880,871.35
Deferred charges: *Discount on debenture bonds		70,416.67
Total assets		$7,418,881.91

LIABILITIES.

Capital stock		$1,000,000.00
First mortgage 5 per cent. bonds	$3,000,000.00	
Less in hands of trustee for Sinking Fund	100,000.00	2,900,000.00
Debenture 5 per cent. bonds		1,500,000.00
Bills payable		244,000.00
Accounts payable		533,682.52
Accounts in suspense		7,771.19
Accrued interest		72,916.68
Reserve for renewal of furnace lining		21,015.95
Reserve for extinguishment of coal and ore properties		19,087.15
Surplus		1,120,408.42
Total liabilities		$7,418,881.91

* To be reduced by equal annual amounts covering the life of the bonds and charged to profit and loss account.

Of the proceeds of the sale of the $1,500,000 of debenture bonds, $400,000 was spent in acquiring and developing new ore property through the Munro Iron Company, and the balance was used in providing additional working capital.

The *Brass World*, in referring to the use of the tumbling barrel for taking the rough edges from small steel articles made by blanking and drawing in a press, says that the barrel, usually an oblique one, is partly filled with the articles and a quantity of sharp sand and gravel, but not sea sand, is added. The articles are covered with water and an ounce or two of salsoda is used for each gallon of water. The sal soda renders the water alkaline and prevents rusting. The steel is tumbled until the sharp edges and burrs have been worn off. This may take from 24 hours to several weeks, according to the character of the work. Care must be used to prevent pitting of the steel surfaces. This will occur unless the water is alkaline and pains taken to have enough water to cover all the articles when the barrel is at rest.

November exports of steel products through Eastern seaports were the heaviest for any one month for nearly three years. The steel rail shipments were particularly heavy, their destination being the Far East.

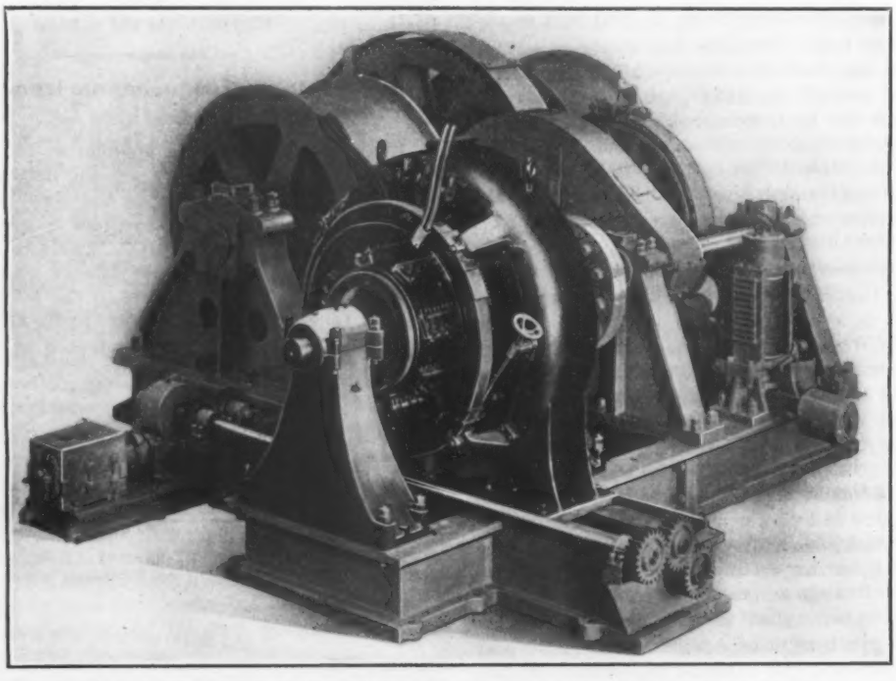
A Lidgerwood Furnace Charging Drum Hoist.

In the operation of a blast furnace it is necessary to avoid as far as possible anything which might interrupt the regularity of the charging. To minimize one of the causes of a furnace going out of commission, the Lidgerwood Mfg. Company, New York, has designed a new type of automatic electric blast furnace skip hoist, the principal feature of which is an arrangement for quickly separating the frame of the motor when it is necessary to replace the armature or any of the field coils. By this arrangement parts can be renewed with unusual facility.

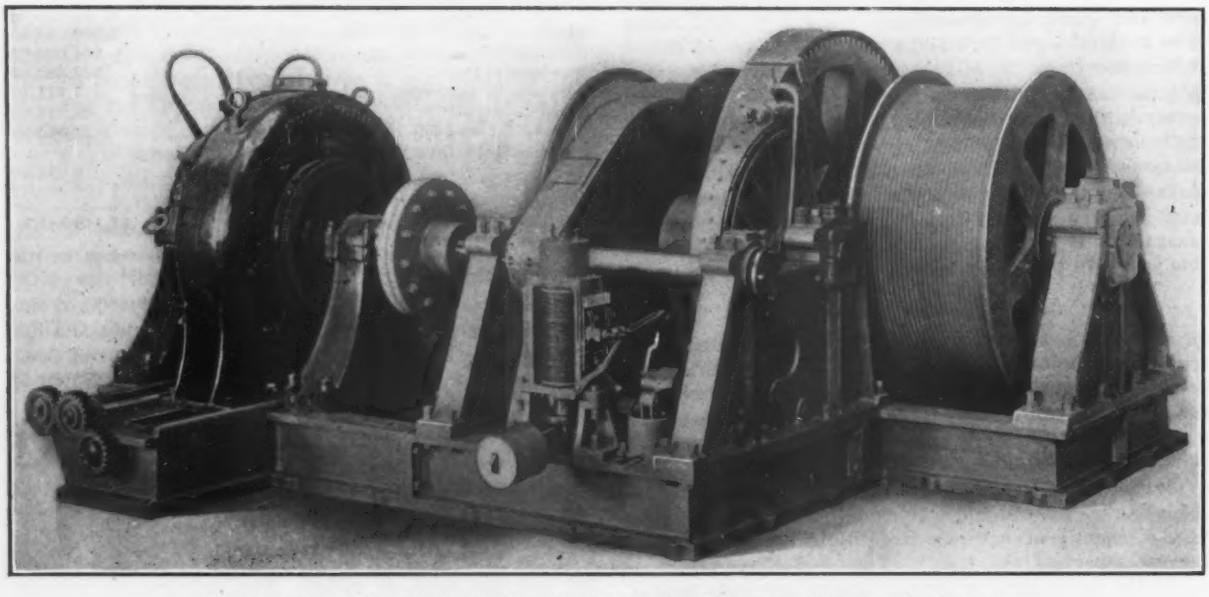
The motor frame is in halves split vertically and held together with two bolts at the top and two at the bottom. The brush rigging is also divided and one-half is attached to each side of the motor frame, so that the two parts may be separated with the frame. There are two large square threaded screws running under the motor, one on each side, through brass nuts which are attached to the respective halves of the base of the motor. These screws when revolved through spur gears and a worm and gear by a 6-hp. 220-volt motor, capable of making 650 rev. per min., can very quickly separate the frame of the motor after the four bolts holding the yoke are removed, 16 sec. being sufficient to withdraw the parts of the frame enough to permit the armature to be removed. To expedite changing the armature two trolleys with chain blocks are suspended from a beam directly over the hoist motor. One of these supports a spare armature while the other is in readiness to remove the old armature. By this means it is claimed an armature can be replaced in 30 min.

The main hoist is of the double drum type, with four bearings supporting the drum shaft, the main driving gear being placed between the two center bearings. This gear is made in halves and is keyed to the drum shaft, which is 15 in. in diameter in the center and 11 in. in diameter in the drum. The main gear wheel is 88 in. in diameter, has 100 teeth, a 12-in. face and 2¾-in. pitch. The pinion is of cast steel and has 19 teeth and the secondary gear, which is 16 in. in diameter, has 89 teeth, 9-in. face and 1½-in. pitch. The pinion for the latter gear is of forged steel and has 20 teeth and 1½-in. pitch.

The main drums are 66 in. in diameter, 30-in. face and are grooved for 1¼-in. rope. The motor gears are inclosed in an oil tight gear case, and the drum gears are covered by a wrought iron guard band. There is a solenoid brake on the intermediate shaft, which is of the V type and of



The Driving End of a Special Lidgerwood Drum Hoist for Blast Furnace Charging.



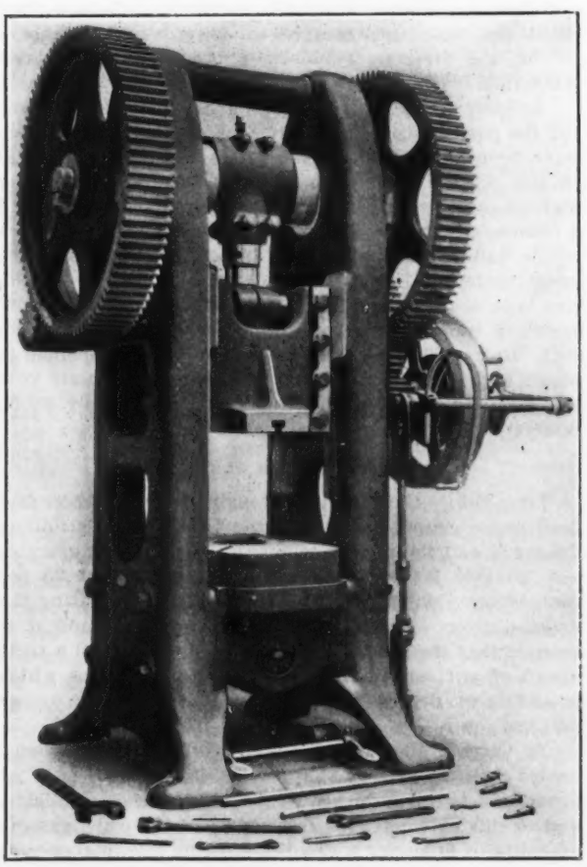
Another View of the Hoist, Showing the Flexible Coupling, Solenoid Brake and Gearing.

special toggle construction. This brake is operated by a 550-lb. solenoid with a 3½-in. travel and settles in a dash pot 8 in. in diameter, to cushion the shock due to the falling of the brake weight. The hoist is mounted on a continuous cast iron bed plate made in sections and bolted together, and is capable of lifting 24,000 lb. at the rate of 225 ft. a minute.

The hoist motor is of 175-hp. capacity, and is of the continuous service type, compound wound and 300 rev. per min. normal speed. The motor throughout is of extra heavy construction, having been designed especially for skip hoist service. The armature shaft has the standard extension and is connected to the hoist by a Baehr flexible coupling. The slow down device is purely mechanical, being mounted on a heavy cast iron bed plate and driven from the armature shaft. It is so constructed that the speed of the bucket at the slow down is exactly the same in every case regardless of the load. A test of 25 trips with varying loads has demonstrated that the bucket will stop within ⅝ in. of the same spot every time. The complete hoist weighs 51 tons and it is set on a solid concrete foundation and bolted down with 32 1¼-in. foundation bolts. No internal gears are used, and therefore no overhung pinion is required. A noticeable feature in the construction of the hoist is the absence of tap or stud bolts, all the bolts being fitted with double hexagon nuts.

A New Ferracute Single Crank Press.

A massive single crank press, built from new patterns by the Ferracute Machine Company, Bridgeton, N. J., and designed by Oberlin Smith, president



A New Heavy Single Crank Press Built by the Ferracute Machine Company, Bridgeton, N. J.

and mechanical engineer of the company, is shown in the accompanying illustration. The press has a long stroke which adapts it for drawing cold from heavy sheet steel, deep drawn seamless shells, automobile hubs, cups for ball bearings and similar work. It can be built with shorter stroke for heavy blanking, trimming, shearing and embossing.. A somewhat larger press of this series, recently built by the company for the United States Government, is being used in the manufacture of cartridge shells for cannon.

The machine illustrated is designated as press DGG 121. The castings which compose the frame are exceedingly heavy and have been made to present an attractive appearance by their neatly rounded corners. Other noteworthy features are the heavily trussed bed and the wide-faced twin gears on each side of the press. These gears are cut from the solid. Having two gears on the crank shaft instead of one tends to relieve the shaft of torsional stress and affords an even pressure by dividing the load between the gears. The back shaft, with its two pinions, which engage the large gears, is a single steel forging made enormously strong to obviate any torsional effect. It provides an equal and even pressure from the pinions to the twin gears and prevents uneven strains to the frame and moving parts connected thereto. The main shaft is forged from high carbon steel. The pitman stem is also of steel and is 6 in. in diameter. The clutch and flywheel are mounted on a stud, which is rigidly attached to the frame, which avoids disturbance of alignment, such as is apt to occur when the supports are detached and bolted to the floor.

The press is equipped with a multi-disk friction clutch of a new and effective design. It is of the automatic stop type, but can be quickly adjusted for stopping the ram by hand at any point of its descent or ascent, or, if desired, can be set for continuous running. Positive knockouts (not shown) are provided when desired, the press being designed so that they can be readily attached. The distance between columns is 28 in; stroke, 3 in.; greatest hight from bed to ram, 19½ in.; adjustment of ram, 6 in.; diameter of flywheel, 35 in.; face of flywheel, 6 in.; weight of flywheel, 750 lb. The press occupies a floor space of 8 ft. 7 in. from right to left and 5 ft. 5 in. front to back, and is 10 ft. 7 in. high. It weighs 25,000 lb., and exerts a pressure of 200 tons. The press can be built with any length of stroke up to 17 in.

The Cockerill Works.—The Société Anonyme John Cockerill turned out product valued at $9,250,000 in the fiscal year ending June 30, 1907. The profits were $1,102,540. Deductions for depreciation, interest, commission, reconstruction of blast furnaces and general expenses, amounted to $570,850. Dividends amounting to 17 per cent. were declared, or about $425,000. The total surplus at the close of the year was $1,960,000. Fresh discoveries were made in the year in the company's Sommorostro iron mines in Spain, which will prolong the working of these deposits several years. New works with special and highly improved tools have been established by the company for turning out quick firing guns. The company expended, in 1906-7, $156,000 in assisting sick workpeople, educating children, pensioning old employees, &c. The balance to the credit of depositors in the savings banks formed by the company for its employees and workmen increased last year from $1,886,500 to $1,981,500.

On October 26, at the hight of the panic, many depositors in New York savings banks who desired to withdraw their funds were required to give 60 days' notice. The time expired last Thursday and many of the banks had prepared themselves for the payment of large sums. It was found, however, that the appreciable restoration of confidence in the meantime had wrought a change in the views of savings bank depositors and the withdrawals were light.

The Bristol Company, Waterbury, Conn., has been awarded a silver medal for its recording instruments exhibited at the Jamestown Exposition. These recorders have received high awards at every exhibition in which they have been entered as competitors in recent years, including the ones held at Paris, Chicago and St. Louis.

Repairs to be made at the Newburg plant of the American Steel & Wire Company, Cleveland, Ohio, include the installation of electrically driven tables for the 23-in. billet mill and the addition of high pressure cylinders to the new 35-in. blooming mill engine, which will be operated hereafter as compound condensing.

The Year in Copper.

BY H. M. COLE, BOSTON.

A furious pace was set in the copper industry in 1907. History was made fast. In point of spectacular price movements the year stands without a parallel in the annals of the industry.

How the Year Opened.

The year opened with the metal market strong, at around 25 cents per pound. Manufacturers were clamoring for their copper deliveries. Retailers were wildly protesting against delays in forwarding manufactured copper goods. Copper smelters were working day and night in a vain endeavor to keep pace with the shipments of ore from the mines. The factories and foundries in the Connecticut Valley and elsewhere could be seen working furiously in the endeavor to make some impression on the steadily accumulating pile of orders pouring in from all parts of the world.

Manufacturers, commission merchants and copper consumers were unanimous in the belief that a famine in the metal was imminent. They all told tales of delayed deliveries and orders on their books for months ahead. The whole manufacturing world was in a frenzy of wild endeavor to keep up with the ever increasing avalanche of orders.

This was the situation in every department of the industry—from the mine to the consumer—which existed for the first quarter of 1907.

A Change Takes Place.

In the latter part of March there were ominous indications here and there that a change was taking place. There was a halt in new orders, but by reason of the vast amount of business booked for future delivery little attention was at that time paid to the slackening tendency in new business. Not a man could be found even as late as April who would publicly venture the assertion that anything more than a temporary halt or breathing spell was taking place, and it may be added that there was general thanksgiving in manufacturing circles over this turn of events, which meant a relief from overwrought and expensive operating conditions.

In June those copper producing interests that had been testing the market found that some of the larger selling companies were cutting prices abroad in order to secure business. The Calumet & Hecla Company was one of the first to discover that competitive selling interests were cutting prices in Paris, and quick to foresee the coming decline, they at once inaugurated the policy of offering to supply their Lake brand—the purest and highest grade of copper in the world—to such buyers as had been quoted prices on electrolytic, which usually sells about ¼ cent per pound below the market for Lake copper. Before the month of July had passed, it was plainly evident that a great transformation had taken place in the copper industry. In contrast with the rush and turmoil of the first three months of the year, there had come an abrupt cessation of new business, and by the time the mining companies had made up their accounts for the first six months of the year they discovered, to their amazement, that but few new orders for copper had been booked since the latter part of March. Copper quotations thereupon literally melted away.

Such a bewildering right-about-face so staggered the large interests in the mining, manufacturing and consuming trades that they were loathe to believe that the new and portentous developments could be more than "a spasm" to be quickly followed by advancing prices.

All Were Fooled.

There are very few men in the trade who can take to themselves any credit for prophesying the disaster which overtook the prices for copper and copper securities in the last half of the year. All were fooled. The copper world had been educating itself to the belief that there was not enough copper to go round, a perfectly natural assumption by reason of the hysterical and ineffectual attempts to keep pace with new business during the first quarter of the year.

The high price of a fraction above 26 cents for copper was not the result of any attempt on the part of the mining companies to squeeze the last drop of blood from the copper buyer. The consumers were alone responsible. In their feverish anxiety to protect themselves with raw material they were continually outbidding each other for copper supplies, and the mining companies, being well sold ahead, would only take the new business at extravagantly high prices.

An Appalling Shrinkage.

During the last six months of the year there was an appalling shrinkage in the prices of copper securities by reason of the sudden and unforseeable transformation in the copper trade. The Boston *News Bureau* showed in one of its numerous statistical compilations that on October 19 there had been a shrinkage in the market price of 46 of the more prominent copper shares of $586,000,000 from the high price of this year. The price of copper, the metal, by that date had been cut in half and more, or from 26 to 12½ cents. If all of the miscellaneous copper issues had been included in the statistical table referred to, the total shrinkage would easily have exceeded $600,000,000, and this is the price which copper investors throughout the country have paid for their bitter experience of the past 12 months.

It was fortunate, indeed, that this loss, awful as it was, came upon the market before the general money panic which followed in the latter part of October and November, as if the New York panic had come upon us at a time of high priced copper, and before the banks and brokerage houses had had opportunity to adjust their loans and customers' accounts to lower metal and share prices, the disaster would have been still more overwhelming.

In view of all that has transpired in copperdom during the past 12 months, the tremendous shrinkages which have been sustained and the losses almost monumental in the aggregate which have fallen upon the investing and manufacturing community, it is truly surprising and a source of congratulation that there has not been a single failure on the Boston Stock Exchange—still the great center of copper investments. Of course, Boston has been scarred and has liquidated millions of dollars' worth of copper stocks, and the cities of Pittsburgh, Duluth, Butte, Chicago, &c., have also been compelled to share with Boston and New York the unfortunate consequence following in the wake of a practically $600,000,000 loss in copper share prices.

An Accumulation of Copper.

Long before the year was brought to a close there had been accumulated—largely by the United Metals Selling Company and the mining companies for which it operates—a total of 300,000,000 lb. of copper, or about 25 per cent. of our Continental production. At this writing the demand from consumers is yet at a low ebb, and it is thought that the production in this country is still a trifle ahead of our consumption and exports, a process which is adding by degrees to the unconsumed store of copper on hand.

In October the United Metals Selling Company succeeded in disposing of 100,000,000 lb. of its copper at around 13 to 14 cents per pound to a foreign syndicate, and to this extent it was relieved from the embarrassing necessity of financing a steadily growing pile of copper at a time when the money stringency was at its hight and the condition of the metal market at its worst.

In the latter part of December the Amalgamated Copper Company, that had already given orders to its Butte managers to cut in half the volume of their output, decided to close down the magnificent Washoe smelter and to cease operations entirely at the Anaconda, Butte Coalition, North Butte, Parrott, Trenton and Washoe properties, leaving only the Boston and Montana to operate to full capacity. The Boston and Montana has a possible output of 95,000,000 lb. per annum, which it can make for 9 cents per pound, treating its product at the Great Falls smelter. Butte is now a city of desolation. This curtail-

ment will reduce the American continental output by 200,000,000 lb. per annum, if maintained for that period.

The Greene Cananea in Mexico was one of the first mines to suspend operations by reason of the fact that its low grade rock and high copper costs made mining operations unprofitable on a 14-cent market; thus 40,000,000 lb. of copper per annum was saved from the accumulating supplies.

Phelps, Dodge & Co., with their Arizona mines, were disposed to co-operate with the Amalgamated policy, and they are now operating at about 75 per cent. of normal capacity.

Some of the Canadian-British Columbia mines, by reason of their high costs, have been compelled to shorten their output materially. It is therefore doubtful if the copper mines of the United States, Canada and Mexico, which last year showed an output of 1,200,000,000 lb. of copper, will, for the year 1907, show an output exceeding 1,000,000,000 lb., and it is furthermore quite likely that at the present time this output is not at the rate of over 750,000,000 lb.

What the Figures Tell.

In illustration of the great fall which has taken place in the prices of copper shares, there are presented in the table below some figures giving by months the average prices of 10 active representative dividend paying copper shares—viz.: Amalgamated, Anaconda, Butte Coalition, Calumet & Hecla, Copper Range, North Butte, Osceola, Quincy, Utah, Consolidated and Wolverine. It is seen by this table that on March 1 the average price of these 10 stocks was $194.68 per share. On December 1 the average had fallen to $107.34. Calumet & Hecla sold as high as $1000 per share and is now selling around $600 per share. In the second column of the same table is presented the average price of Lake copper in cents per pound for each of the 12 months in 1907, and in the third column the exports from this country are shown. The table follows:

Share Prices, Copper Prices and Exports.

	Average price 10 stocks.	Average price Lake copper (In cents per pound.)	Exports of copper for month. (In gross tons.)
January 1	$185.03	25.55	17,039
February 1	193.76	25.71	9,174
March 1	194.68	26.05	13,432
April 1	170.28	25.37	17,363
May 1	170.89	25.21	9,010
June 1	158.25	24.87	16,193
July 1	160.67	23.35	14,774
August 1	153.21	20.92	13,458
September 1	138.91	16.75	17,157
October 1	116.96	14.12	29,161
November 1	110.51	14.10	33,787
December 1	107.34	*13.75	*28,000

* Estimated.

The one primary cause for the general smashup in copper was the inability of the great manufacturing and consuming companies to finance new construction. With the scarcity of money and the ever contracting ability to sell new securities, trolley companies, power transmission enterprises, electrical propositions, &c., found themselves face to face with conditions which prohibited further expansion. Operatives were discharged, construction forces were laid off, contraction and curtailment were the orders given at every turn. Little wonder was it, therefore, that new orders for copper were cut off as with a knife.

The above is largely a reflection of conditions peculiar to the United States. While the money panic was in many respects worldwide in scope, still Europe has been in much better shape in the matter of copper consumption than the United States, and Europe has taken, not altogether for immediate consumption, however, an enormous amount of copper which menaced the American situation.

The Outlook.

The outlook for copper, depends, of course, primarily upon the developments in the money market. With confidence regained, with currency gravitating back to the great reserve centers where new industries are financed, with money ruling at such figures as will permit and encourage the sale of new securities, the wheels of industry will once more revolve as before and the demand for copper will again be stimulated. When this demand comes it will find the producers utterly unable immediately to supply it. Discharged miners must be brought back, smelter fires must be relighted and it will take months for the refined product to find its way to the New York market after orders have been given to the Western mines to resume.

This is still the age of electricity. We are not going back to the days of the stage coach. A period of needed rest has been forced upon us. Labor, in many instances autocratic and unreasonable, having had its pay reduced will now come nearer giving a day's work for a day's wages.

From the standpoint of the investor it can be said that never were copper shares so widely distributed as to-day. Every dividend paying mine, and, in fact, many which are not dividend payers, have shown a wonderful increase in the number of stockholders, testifying to the wide distribution which has taken place during the great liquidation of 1907. The floating supply of copper stocks was never smaller than to-day. When the inevitable improvement in general conditions finally arrives it will find speculative conditions ideal.

Just when this improvement will take place no one is wise enough to prophesy. Much depends upon the money rate and the ability of the American people to recover quickly from the shattering blows of the past 12 months.

Lake Commerce Through the Sault Canals.

The comparative statement of lake commerce through the canals at Sault Ste. Marie, Michigan and Ontario, for the seasons 1907 and 1906, shows an increase of 12 per cent. in net freight, while traffic in 1906 exceeded that of 1905 by 17 per cent. The total east and west bound freight movement was 58,217,214 net tons in 1907, against 51,751,080 net tons in 1906 and 44,270,680 net tons in 1905. Coal shows the heaviest percentage of increase, being 49 per cent. for hard and 28 per cent for soft coal, but in bulk iron ore is more important, increasing from 35,357,042 net tons in 1906 to 39,594,944 net tons in 1907, or a gain of 12 per cent. Wheat shipments were 16 per cent. ahead of 1906, but all other commodities fell off.

The United States Canal was opened April 23 and closed December 11, 1907; season, 233 days. The Canadian Canal was opened April 22 and closed December 15, 1907; season, 238 days.

The following table, which is part of those compiled at St. Marys Falls Canal, Michigan, under direction of Col. Chas. E. L. B. Davis, Corps of Engineers, United States Army, gives some details of traffic:

	Total traffic— Season 1906.	Season 1907.	Per cent. decrease.
Vessels:			
Steamers, number	18,138	17,245	5
Sailing, number	2,817	2,303	18
Unregistered, number	1,200	889	26
Total number	22,155	20,437	8
Tonnage:			
Registered, net	41,098,324	44,087,974	*7
Freight, net	51,751,080	58,217,214	*12
Coal:			
Hard, net tons	1,011,375	1,506,668	*49
Soft, net tons	7,728,255	9,893,427	*28
Flour, barrels	6,495,350	6,524,770	..
Wheat, bushels	84,271,358	98,135,775	*16
Other grain, bushels	54,343,155	43,463,338	20
Manufactured and pig iron, net tons	391,105	307,941	21
Salt, barrels	468,162	460,802	2
Copper, net tons	107,633	89,959	16
Iron ore, net tons	35,357,042	39,594,944	*12
Lumber, M ft. B. M	900,631	649,320	28

* Increase.

The proportion of freight carried in the United States and Canadian canals is shown in another statement, from which it appears that out of a total east and west bound movement of 58,217,214 tons only 26 per cent., or 15,585,368 tons, passed through the Canadian Canal.

THE CHICAGO IRON TRADE IN 1907.

BY T. J. WRIGHT.

Under the impulse of a forward movement that gained great impetus toward the close of the previous year, 1907 opened with a phenomenal demand for iron and steel products and material. Every furnace, mill and factory in this district was overwhelmed with accumulated orders, the result being that deliveries were delayed weeks and months by the sheer incapacity of plants to produce the volume of goods required.

This condition continued with unabated force until June, when a tightening money market, far reaching in its effects, began to be noticeably felt throughout the Middle West. It was first manifested in the hesitancy of consumers to contract freely for future requirements, but had no immediate effect upon manufacturing interests, which were then bending every energy to complete overdue orders. But the slow subsidence of demand, starting at that time, culminated in a sensational drop in November when, following an extreme and precipitate contraction of currency, compelling a resort to clearing house checks and other emergency measures, business was temporarily brought well night to a standstill. A slight recovery followed, but a universal policy of curtailment was inaugurated, which resulted in cancellation and postponement of orders, so that the year closed with under 50 per cent. of the productive capacity of Chicago's steel making and steel working plants in operation. Thus within a brief 12-month cycle was witnessed a complete reversal of industrial conditions. Crowding activity was succeeded by extreme dullness, inadequate supply gave way to an unplaced surplus, and progressive expansion yielded to systematic retrenchment.

A Year of Distinctive Achievement.

Nevertheless, in all that makes for permanency in growth and advancement toward greater importance as a productive center for iron and steel, the record of 1907 will go down as one of distinctive achievement for the Chicago District. Although the sum total of accomplishment was somewhat diminished by the effects of unfavorable financial developments, yet it can safely be said that the temporary halt thus imposed upon forward progress was fraught with no lasting results prejudicial to the continued ascendency of this territory as a steel making and steel consuming district.

By reason of its imposing magnitude and the influential bearing it will have upon the promotion of steel consuming industries of Chicago and the Middle West, the new steel plant of the United States Steel Corporation, now rapidly taking form at Gary, Ind., continues to occupy a foremost place of interest. The work of construction, actively began in 1906, was pushed vigorously forward through the year. Enough has already been accomplished to insure the entrance of this plant into the ranks of producers before the close of 1908, if it is desired to put it in operation within that period. Of the eight blast furnaces, with a total annual capacity of 1,400,000 tons, now under construction, four are almost completed, and the remainder are well under way. Fifty per cent. of work on the rail mill, which will add 900,000 tons to the Western product, is finished, and the billet mills are about one-quarter done. Work has steadily progressed through the year on the 56 open hearth furnaces, designed to furnish 2,400,000 tons of steel annually. The entire steel output of the plant will be open hearth.

The South Works of the Illinois Steel Company were enlarged by the addition of two new finishing mills, one a 24-in. rerolling rail mill of 10,000 tons monthly capacity, and the other a 30-in. universal plate mill, designed to turn out 10,000 tons a month. The latter is the first mill of the kind to be established west of the Pittsburgh District and forms a needed complement to the structural output of the works. It also possesses the distinction of being the first mill of its kind in this country to be electrically driven by direct connected motors.

While the independent interests did not contribute largely to the gain in new tonnage capacity, they have under way and well toward completion plant additions and new works that will help materially to swell the local aggregate production in finished material. These include a continuous bar mill under construction by the Inland Steel Company at Indiana Harbor; a sheet bar mill nearing completion at Chicago Heights, built by the Calumet Steel Company, and a small bar iron mill, the erection of which was begun early in the year at Joliet, Ill., by the Joliet Iron Products Company.

Mill and Furnace Construction Summarized.

The following list comprises completed, under construction and projected additions to the iron and steel producing capacity of the Chicago District in 1907. Four of the eight furnaces of the Indiana Steel Company, though practically finished, will not be put into operation for some months:

BLAST FURNACES.

Blast furnaces completed in 1907, annual capacity 1,110,000 tons:

Four, Indiana Steel Company, Gary, Ind.; annual capacity, 720,000 tons.
One, Inland Steel Company, Indiana Harbor, Ind.; annual capacity, 140,000 tons.
One, Federal Furnace Company, South Deering; annual capacity, 125,000 tons.
One, Northwestern Iron Company, Mayville, Wis.; annual capacity, 125,000 tons.

Blast furnaces under construction, annual capacity 945,000 tons:

Four, Indiana Steel Company, Gary, Ind.; annual capacity, 720,000 tons.
One, Federal Furnace Company, South Deering; annual capacity, 125,000 tons.
One, Thomas Iron Company, Milwaukee, Wis.; annual capacity, 100,000 tons.

OPEN HEARTH STEEL FURNACES.

Open hearth steel furnaces completed:

Two, 50-ton, Inland Steel Company, Indiana Harbor, Ind.

Open hearth steel furnaces under construction:

Fifty-six 60-ton furnaces, Indiana Steel Company, Gary, Ind.

FINISHING MILLS.

Rail mills completed:

Illinois Steel Company, South Works, 24-in. light rerolling rail, 12 to 80 lb. sections; monthly capacity, 10,000 tons.

Rail mills under construction:

Indiana Steel Company, Gary, Ind., standard section open hearth rails; monthly capacity, 75,000 tons.

Plate mills completed:

Illinois Steel Company, South Chicago, 30-in. universal plate mill for plates 6 in. to 30 in. wide; monthly capacity, 10,000 tons.

Plate mills under construction:

Indiana Steel Company, Gary, Ind., sheared plate mills; monthly capacity, 30,000 tons.

Bar mills completed:

Wisconsin Steel Company, South Deering, continuous bar mill, eight stands of 16-in. and three stands of 14-in. rolls; monthly capacity, 6500 tons.

Bar mills under construction:

Inland Steel Company, Indiana Harbor, Ind., continuous bar mill; monthly capacity, 6500 tons.
Calumet Steel Company, Chicago Heights, Ill., 14-in. bar mill to roll steel bars and hard angles.
Joliet Iron Products Company, Joliet, Ill., bar iron mill to roll from scrap.

MISCELLANEOUS.

Under construction:

Indiana Steel Company, Gary, Ind., blooming, slabbing and billet mills.
Inland Steel Company, Indiana Harbor, Ind., blooming and sheet bar mill.
Sellers Mfg. Company, Mayfair, Ill., tie plate and splice bar mill.

Building Plans.

Few years have been more prolific in the development of building plans than 1907. Some of the most important projects, however, were arrested by the unfavorable turn in financial affairs, which made it difficult to provide funds for even the soundest undertakings. Notwithstanding these and other defections, the permits for the year showed a decline of but $2,044,560 over the re-

markable record of 1906. The figures for 1907 and the two preceding years were: 1905, $62,500,000; 1906, $64,247,330, as compared with $59,094,180 for 1907. Permits issued the last week in December swelled the total for that month by $3,600,000. The structures of chief importance contributing to the above total, which include notable tonnages of structural steel, were as follows: Corn Exchange Bank, Chicago Telephone Company, La Salle Hotel, University Club, Commonwealth Edison Company, power house extension; Joseph T. Ryerson & Sons' fabricating shops, Montgomery, Ward & Co., warehouse. The last mentioned is of reinforced concrete and is probably the largest building of this construction yet undertaken, 5000 tons of steel being required for the reinforcing. An aggregate of 35,000 tons of steel is comprised in the above buildings.

Among the industrial plants of note completed during the year the most conspicuous perhaps was that of the Standard Steel Car Company, at Hammond, Ind., which began operations in June. The importance of this plant is better appreciated when it is stated that it will normally consume more than 300,000 tons of plates annually. A notable addition to the foundry interests was made by the Griffin Wheel Company, which enlarged its West Pullman plant by the building of new shops, having a capacity of 1000 wheels per day. Besides a new plant under construction by the Chicago Railway Equipment Company, prospective work in this line developed during the year, embraces large additions contemplated by the Pullman Company and the Blue Island Car & Equipment Company. The American Car & Foundry Company secured a site adjacent to the Steel Corporation's new plant at Gary, Ind., for the establishment of an extensive plant.

Railroad Retrenchment.

But little extension work projected by Western railroads, which was not already financed and under way at or soon after the first of the year, was undertaken in 1907. Rail purchases for 1908, which, following the precedent of the former year would have been made early, were first delayed, and then in a large measure indefinitely postponed. Some tonnage contracted for delivery in 1907 was carried over into the succeeding year at the request of the roads; but the Illinois Steel Company's rail mill had specifications sufficient to keep it in operation beyond December. Curtailment of expenditures for equipment, made necessary by inability to secure needed funds, was carried by the railroad interests to the farthest limit.

The effect of this policy was keenly felt by every department of the iron and steel trade. Cancellations of car orders placed and the withholding of those contemplated resulted in a wholesale reduction in the output of car shops. With plans completed and bids in on construction and equipment of new shops requiring 9000 tons of structural material, the Pullman Company decided, in view of the unfavorable developments, to defer the work. Two other railroad equipment plants would in all probability have been added to the list of completed improvements but for the untoward turn of events.

The Course of Prices.

Considering the unprecedented demand that prevailed for iron and steel during the first five months of the year, the limited range of fluctuations in prices of finished material was most remarkable. Instead of soaring upward as in other boom periods, but few advances were made, and these were generally restricted within moderate limits. This was chiefly due to the conservative attitude assumed by the leading producer that exerted a powerful influence in restraint of undue expansion of values. The wisdom of this policy became apparent later when reaction set in and orders were insufficient to keep mills going. Instead of a demoralizing slump such as is usually seen in like circumstances, prices were maintained at practically an even level. The pursuance of this policy, it is predicted, will go far toward the elimination of extreme price fluctuations in the future, such as have characterized the course of the iron and steel market in the past. Owing to mill congestion and consequent delay in execution of orders, premiums for prompt shipment from independent mills were sometimes charged. Comparison of prices of finished iron and steel for the year with those of former years is afforded in the following table:

Average Chicago Base Prices of Finished Iron and Steel, 1907.

Month.	Common bar iron. Cents.	Soft steel bars. Cents.	Structural shapes. Cents.	Smooth machinery steel. Cents.
January	1.81½	1.76½	1.86½	2.01½
February	1.81½	1.76½	1.86½	2.16½
March	1.81½	1.76½	1.86½	2.16½
April	1.80	1.76½	1.86½	2.16½
May	1.76½	1.76½	1.86½	2.16½
June	1.78	1.78	1.88	2.18
July	1.78	1.78	1.88	2.18
August	1.78	1.78	1.88	2.18
September	1.78	1.78	1.88	2.18
October	1.78	1.78	1.88	2.18
November	1.76	1.78	1.88	2.18
December	1.75	1.78	1.88	2.18
Average for year	1.78½	1.77⅓	1.87½	2.16⅛
Average for 1906	1.71¼	1.67¾	1.86½	1.92⅛
Average for 1905	1.64¾	1.64⅔	1.78⅓	1.89¾
Average for 1904	1.41¼	1.49½	1.70¾	1.74¼
Average for 1903	1.64¾	1.72	1.75	1.97¼
Average for 1902	1.71	1.73½	1.75	2.00
Average for 1901	1.58	1.58	1.70	1.96
Average for 1900	1.75	1.75	2.00	2.25
Average for 1899	1.80	1.90	2.00	2.50
Average for 1898	1.05	1.10	1.25	1.55
Average for 1897	1.11½	1.13	1.19	1.53

It will be noted by reference to the price tables of finished iron and steel that, aside from an advance of 1½ cents in freight rate from Pittsburgh, the monthly averages of quotations show an extreme variation of only $1 a ton on bar iron. Steel bars and structural shapes were unchanged, and barring $3 a ton advance in January, smooth machinery steel remained steady throughout the year. Though at the hight of the demand, premiums on prompt plate shipments ran up to $4 a ton, the only advance made by the principal interest was one of $2 a ton in February. Crude iron prices, on the other hand, being subject to no moderating influence, went steadily upward until June, at which time a decline set in that culminated at the close of the year with a spread of over $7.50 between the high and low monthly average of quotations.

PIG IRON.

Notwithstanding the steady increase in pig iron production that has taken place, the year opened with a rate of consumption equal to, if not somewhat in excess of, furnace capacity. With every available furnace, both North and South, in blast there was a pronounced shortage of foundry irons during the first three months of the year. The scarcity was emphasized and aggravated by inadequate car service that from February until May seriously interfered with the movement of iron from furnace yards. Shipments were delayed to such an extent that melters were in some instances compelled to shut down a few days at a time pending the arrival of iron. This condition gave rise to an extravagant spread between prompt and forward delivery prices, which ranged from $3 to $4 a ton. In spite of the abnormal advance in prices which in the latter part of January reached $23, Chicago, for Northern No. 2, and $19, Birmingham, for Southern No. 2 Foundry on second half requirements, a large tonnage was placed for this period.

By May furnace schedules of tonnage for sale for the entire year had been so nearly completed that some of the principal Southern producers announced their withdrawal from the market for second half delivery, and a large part of the Northern merchant output was engaged. Best illustrative, perhaps, of the abnormal situation created by the extraordinary demand and high prices that prevailed in the first half of the year is the fact that imports of foreign pig iron in this market not only became possible, but were actually made. Approximately 25,000 tons were brought in before changing conditions made the domestic product available for all requirements.

Influenced by indications that developed in May pointing to a decrease in consumption and distrust of the permanency of existing price levels, purchasers began to grow wary of future commitments, and the demand for forward tonnage dropped off sharply in June; in consequence all through the latter half of the year purchases were largely confined to small lots for immediate use.

Yet, had it not been for the cancellations and postponements of booked orders resulting from the financial upheaval in November, furnaces would have been able to continue operations throughout the year. As it was, however, more than 50 per cent. of the producing capacity contiguous to this market was compelled to blow out before the end of December for lack of live orders.

Pursuant to an announcement made prior to January 1, the freight rate from the Birmingham District was, in April, advanced 45 cents a ton. This rate was first scheduled to be effective February 1, but, as a result of vigorous protests made by shippers, it was postponed in order to afford time for the moving of iron delayed in furnace yards because of car shortage.

By-product coke, which has heretofore been a factor only in the foundry trade, will in the future figure importantly in furnace consumption. At Joliet, Ill., 275 Koppers by-product ovens are now being built to furnish coke for the local plant of the Illinois Steel Company. If the results expected from these ovens are realized, it is the intention of the Steel Corporation to supply coke for the new plant at Gary in the same manner; this will, of course, necessitate the construction of a large number of ovens at that place, which would obstruct a promising prospective outlet for Eastern coke. The By-Product Coke Corporation has now in operation at South Chicago 180 Solvay ovens, and a like number are being operated by the Milwaukee Solvay Company at Milwaukee.

A merger of the Northern charcoal pig iron interests was effected in May by the formation of the Lake Superior Iron & Chemical Company, Detroit, Mich., which took over the Ashland Furnace in Wisconsin, and the Manistique, Newberry, Elk Rapids, Boyne City and Chocolay furnaces in Michigan.

Price fluctuations of pig iron for the year, as compared with those of preceding years, are shown in the following table:

Average Chicago Prices of Pig Iron, 1907.

Month.	Northern coke No. 2.	Lake Superior charcoal.	Ohio strong softeners No. 1.	Southern coke No. 2.
January	$25.50	$26.80	$26.00	$26.75
February	25.50	27.00	26.00	26.85
March	25.75	26.75	26.00	26.23
April	26.00	26.50	26.00	25.85
May	26.50	27.40	26.50	26.65
June	26.25	27.50	26.25	26.60
July	25.38	27.00	26.00	25.85
August	24.50	27.20	25.50	24.45
September	23.75	27.00	25.00	23.10
October	22.10	26.20	22.90	22.15
November	20.32	25.12	21.56	20.35
December	18.63	24.25	20.38	18.85
Average for the year.	$24.18⅛	$26.56	$24.84	$24.47½
Average for 1906	20.15	20.72	20.70	19.44¾
Average for 1905	17.30¼	17.99¾	18.50¾	16.66½
Average for 1904	14.04¾	15.50	15.64¾	13.92½
Average for 1903	18.88½	22.13¼	21.33	18.31¼
Average for 1902	20.50	23.50	23.30	20.10
Average for 1901	15.00	17.50	16.50	14.60
Average for 1900	19.12½	22.00	20.75	18.35
Average for 1899	17.65	19.80	19.67	17.75
Average for 1898	11.00	11.60	12.00	10.45
Average for 1897	10.60	13.00	12.25	10.25

OLD MATERIALS.

An extremely high level of prices was reached in scrap, and for the first six months it was well maintained. The scarcity of pig iron during a part of this period brought on a strong demand for melting grades, and the proportion of scrap used for foundry mix was largely increased. No. 1 cast rose above $20 in March and heavy melting steel brought $16. Rerolling rails were in demand, and touched $19, while the general average of quotations on No. 1 wrought in January was $16.35. Reaction began with the wane of consumption in July, and thence forward a steady decline took place, which in December showed a net loss in values of a little more than $6 a ton.

The steady growth of the scrap supply makes it a factor of increasing importance in the production of iron and steel. Owing to its position as the center of a large extent of railroad mileage, Chicago is pre-eminently a scrap market. In order to facilitate the handling and distribution of the large tonnage which naturally seeks an outlet here, scrap yards equipped with modern machinery for the economical sorting and preparation of material ready for use are needed.

The monthly average of prices for the year, together with the yearly averages for former years, is shown as follows:

Average Chicago Prices of Old Material, 1907.

Month.	Old iron rails. Gross tons.	No. 1 railroad wrought. Net ton.	No. 1 busheling scrap. Net ton.	Heavy cast scrap. Net ton.	Heavy melting scrap. Gross ton.
January	$27.40	$16.35	$11.80	$17.80	$16.80
February	25.50	15.50	11.13	18.25	15.75
March	25.00	15.25	11.00	19.50	16.00
April	24.88	15.25	11.00	18.88	15.75
May	24.50	15.45	11.50	18.55	15.60
June	24.50	16.06	11.94	18.94	16.25
July	23.75	15.06	11.25	18.44	16.12
August	20.65	14.40	10.50	16.75	15.10
September	20.25	14.38	10.50	16.81	14.75
October	20.05	14.60	10.30	16.25	14.70
November	17.63	12.32	8.25	14.00	12.63
December	15.50	11.00	7.50	13.00	11.50
Average for year.	$22.46¾	$14.63½	$10.55½	$17.26½	$15.08
Average for 1906.	23.04	15.62	10.69	14.55	14.74
Average for 1905.	20.18	16.14½	11.11¾	13.49½	13.96½
Average for 1904.	16.56¼	12.45	8.76½	10.95½	10.72
Average for 1903.	20.28¾	16.07	12.05	14.74½	15.50½
Average for 1902.	23.91	19.68½	13.81½	15.03	17.37½
Average for 1901.	19.50	15.00	10.80	11.25	....
Average for 1900.	17.90	15.00	8.00	11.00	....
Average for 1899.	21.00	17.25	10.15	12.40	....
Average for 1898.	12.37½	11.25	6.62½	8.15	....
Average for 1897	11.67	11.20	7.00	7.25	....

Labor.

Freedom from disturbing controversies has, with a few comparatively unimportant exceptions, characterized the relations of organized labor and employers. Numerous demands for higher wages were made in the first half of the year, and were in the majority of cases met by advances representing in whole or in part what was demanded. The most potent influence operating to support the contentions of workers for increased wage scales was the pronounced scarcity of labor. Shops were frequently compelled to run short of their capacity because of inability to secure help.

The stove molders secured a 5 per cent. advance with an agreement extending through 1908, and the Illinois Steel Company began the year with a 10-cent advance in daily wages of unskilled labor. The most serious strike of the year occurred in the works of the Chicago Shipbuilding Company at South Chicago in February, resulting in a shutdown of the plant, which remained practically closed throughout the year.

Following the money panic in October conditions were reversed and working forces were then reduced, throwing thousands of men out of employment. No general reduction of wages took place up to the end of the year, but the outlook promises readjustment on the basis of lower wage scales when present agreements have expired, unless a strong revival of business takes place and commodity values are sustained.

The Outlook.

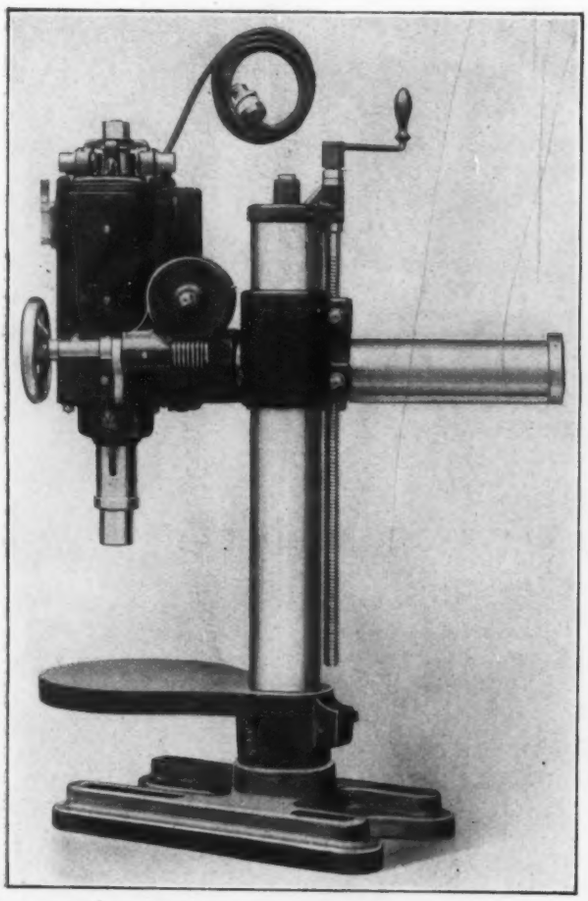
Preceding all else in the rehabilitation of industrial activity and the restoration of public confidence there must come a satisfactory clearing of the financial situation. A hopeful degree of progress in this direction is observable throughout the West; the stringency of currency has relaxed locally, and within a few weeks is expected to disappear entirely.

Owing to the prompt action taken in blowing out and shutting down furnaces and mills, producers enter the new year with no surplus of accumulated stock. Consumers of finished product have for several months been buying material only for current requirements, and for the past two months specifications on existing contracts have been generally withheld. Melters of foundry pig iron, it is estimated, will not as a rule be forced into the market for possibly 60 days, but inquiries in the market indicate that a few large consumers will need considerable tonnage. With the balance of foreign trade strongly in our favor, a large surplus of cereal products to be marketed which will command profitable prices, and conditions basically sound existing throughout the country, it seems only reasonable to expect at least a normally prosperous business in 1908.

The Hisey Portable Electric Radial Drill.

Herewith is illustrated the improved Hisey portable electric Scotch radial drill of 2-in. capacity, made by the Hisey-Wolf Machine Company, Cincinnati, Ohio. This drill has a feed through the hand wheel, with quick return by hand, and the head may be swiveled and adjusted radially to drill at any part of a circle of 24 in. radius. The hand wheel and wormbox have a swivel adjustment in a vertical plane, permitting the drill to be inclined at any angle below the horizontal, making it possible to drill in corners and close places. The motor has two speeds controlled by a thumb lever at the lower end of the head.

The horizontal and vertical columns are of hollow steel tubing. The upright column is fitted with a screw to raise and lower the horizontal arm, and the latter has a rack and pinion for in and out adjustment. By



The 2-In. Portable Electric Scotch Radial Drill Made by the Hisey-Wolf Machine Company, Cincinnati, Ohio.

means of these adjustments the operator can position the motor to the work by merely turning crank handles. The table is adjustable and detachable. The drills are made in three sizes of ⅞, 1¼ and 2 in. capacities, and for either direct or alternating current. Current for the motor is obtained from an ordinary lamp socket.

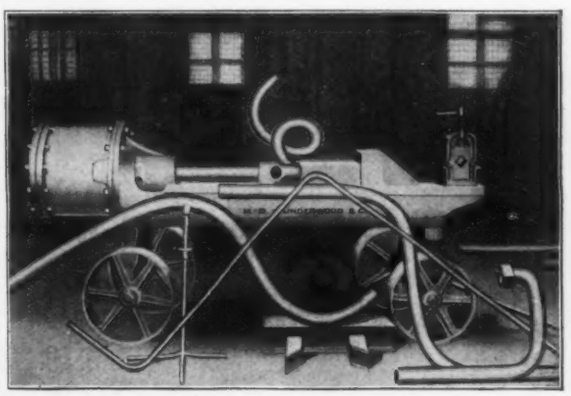
This drill is entirely self-contained, and is portable in the full sense of the word, as one man can easily handle it. The range of work is unlimited, as it can be taken to any part of the shop or any distance for outside work. Since it can be carried to heavy work, which cannot conveniently be taken to a drill press, the usefulness of the drill in large machine shops, boiler works, shipbuilding plants and bridge building and general construction work will be readily recognized.

Six gates weighing 20,000 lb. each will be used at the Roosevelt dam in connection with the Salt River project being erected by the United States Reclamation Service. The gates will be subjected to a total maximum pressure of 80,000 lb.

The Underwood Pneumatic Pipe Bender.

A machine particularly adapted to railroad repair shop work, where a large amount of pipe bending is required in connection with the erection and repair of locomotives, is shown in the accompanying illustration. It is a new portable pneumatic pipe bending machine, which is being manufactured and placed on the market by H. B. Underwood & Co., Philadelphia, Pa., and is equally well suited for general pipe bending work. The machine is about 5 ft. long and is mounted on truck wheels for convenience in hauling about the shop.

Compressed air of ordinary shop pressure, say, 80 to 90 lb., supplies the power for the operation of the machine. The cylinder is 12 x 16 in. in size, and the piston head is normally held against the head of the cylinder by a heavy spring. To the end of the piston rod the female die of the machine is fastened. The male dies, which vary in size according to the work to be done, are loosely laid against the angle block at the right of the machine, being maintained central by means of an ordinary slot and projection. This permits of ready change of the dies and enables the work of bending to be done with great rapidity. The pipe to be bent is not clamped in any way, but is simply held in position by the operator of the machine. The operation of bending



A Portable Pneumatic Pipe Bending Machine Made by H. B. Underwood & Co., Philadelphia, Pa.

is controlled entirely by a three-way cock at the right of the machine (not shown in the accompanying engravings), the opening of which admits air to the cylinder, exerting the necessary pressure against the head to force the female die against the pipe. The pressure can be varied by this means, and there is claimed to be absolutely no danger of flattening the pipe. A 2-in. pipe can be bent to a right angle on this machine in 2 min.

Dies are furnished of standard radius for locomotive work for ½ to 2 in. pipe, and of 12 to 13 in. radius. Special dies of any required radius or shape can, however, be furnished if desired. It is the intention of the builders to supply this tool either with or without trucks or pipe vise, the latter being simply attached to the machine for convenience.

The Reeves Engineering Company, Mt. Vernon, Ohio, has recently been incorporated and has purchased the equipment of Reeves Brothers, builders of gas and gasoline engines. The new company will continue to build these designs of engines, as well as a line of compressors, and will also manufacture gray iron castings. The plant of the Challingsworth Foundry & Machine Company, at Mt. Vernon, has been purchased and is now being rebuilt. A number of machine tools will be added to the previous equipment of Reeves Brothers, to make the plant complete in both foundry and machine departments.

A mixture of boric acid, 1 lb., pulverized chlorate of potash 4 ounces, and carbonate of iron, 3 ounces, is claimed to be a good flux for brazing cast iron. The flux should not be applied until the metal has been carefully cleaned and the sections to be brazed have reached a bright red heat.

THE LARGEST PLANER IN THE WORLD.

The planer which has just been finished for Mackintosh, Hemphill & Co., Pittsburgh, Pa., by the Niles-Bement-Pond Company's Bement-Miles Works, Philadelphia, Pa., is not only the largest, heaviest and most powerful planer in all probability that has ever been built, but is also the most versatile. In a sense it combines the functions of a slotter, a shaper and a planer, since each of the two heads is fitted with a slotter bar and is arranged for transverse planing. Obviously a machine weighing over 420 tons, or 845,000 lb. to be exact, is intended for extremely heavy work, and it is expedient to perform as many operations as possible with one setting of the work. Other features of interest are the use of pneumatic clutches to give the necessary reversing motions, pneumatic control of the feeds to the heads and the table, and the entire absence of belts, all driving being direct through gearing from electric motors. There are four of these representing a total capacity of over 200 hp. A 100-hp. motor provides the main drive, a 50-hp. motor operates the slotting and cross planing movements, a 20-hp. motor raises and lowers the cross rail, and a 7½-hp. motor travels the heads on the cross rail. It will be seen that all adjustments are by power, for it would be impracticable to make more than the very fine settings by hand, as the time lost would defeat the most important advantage of the machine, the ability to do heavy work with the greatest rapidity. In addition a 30-hp. motor, which might be regarded as an auxiliary, drives an air compressor, making the pneumatic clutches independent of the shop compressed air system. This motor can, however, be dispensed with if it should prove desirable to connect to the existing air supply. All of the motors are controlled from a switch panel at the rear of the right housing.

As further evidence of the remarkable size of this planer the following dimensions are interesting: Distance between the uprights, 14 ft. 4 in.; maximum distance from the table to the bottom of the cross rail, 12 ft. 2 in.; maximum stroke of the table, 30 ft.; maximum stroke of the slotter bar, 8 ft.; total width of the bed, 13 ft.; length of the bed, 60 ft.; width of each of the table ways, 15 in.; hight of the tool slides, 7 ft. 8 in.; vertical traverse of the tool slides, 4 ft.; width of face of each upright, 2 ft. 6 in., and hight of the cross rail, including the top rib bracing, 5 ft. The cross rail is long enough to permit the full traverse of either head between the uprights.

In Figs. 1 and 4 may be seen the main drive through gearing from the 100-hp. motor to the pneumatic clutches at the base of the upright. The speed of these clutches may be varied somewhat by changing the speed of the motor, which has a variation of 1 to 1¼, and a further range is effected by reversing the two change gears, so that cutting speeds are available from 14 to 25 ft. per minute and return speeds from 52½ to 65½ ft. per minute. The pneumatic clutches are completely inclosed, and are of the already familiar type made by this company in which a large number of friction disks are used to give an enormous friction area within a compact space. The compressed air to operate these clutches is controlled by a small valve, easily moved by hand, to start, stop or reverse the table. It will readily be appreciated that it would be almost out of the question to transmit power to a planer from so large a motor by belt, but the pneumatic clutches have been found fully capable of doing the work satisfactorily. Except for being unusually heavy and powerful the drive from the clutches to the table racks, which are in duplicate, is substantially the

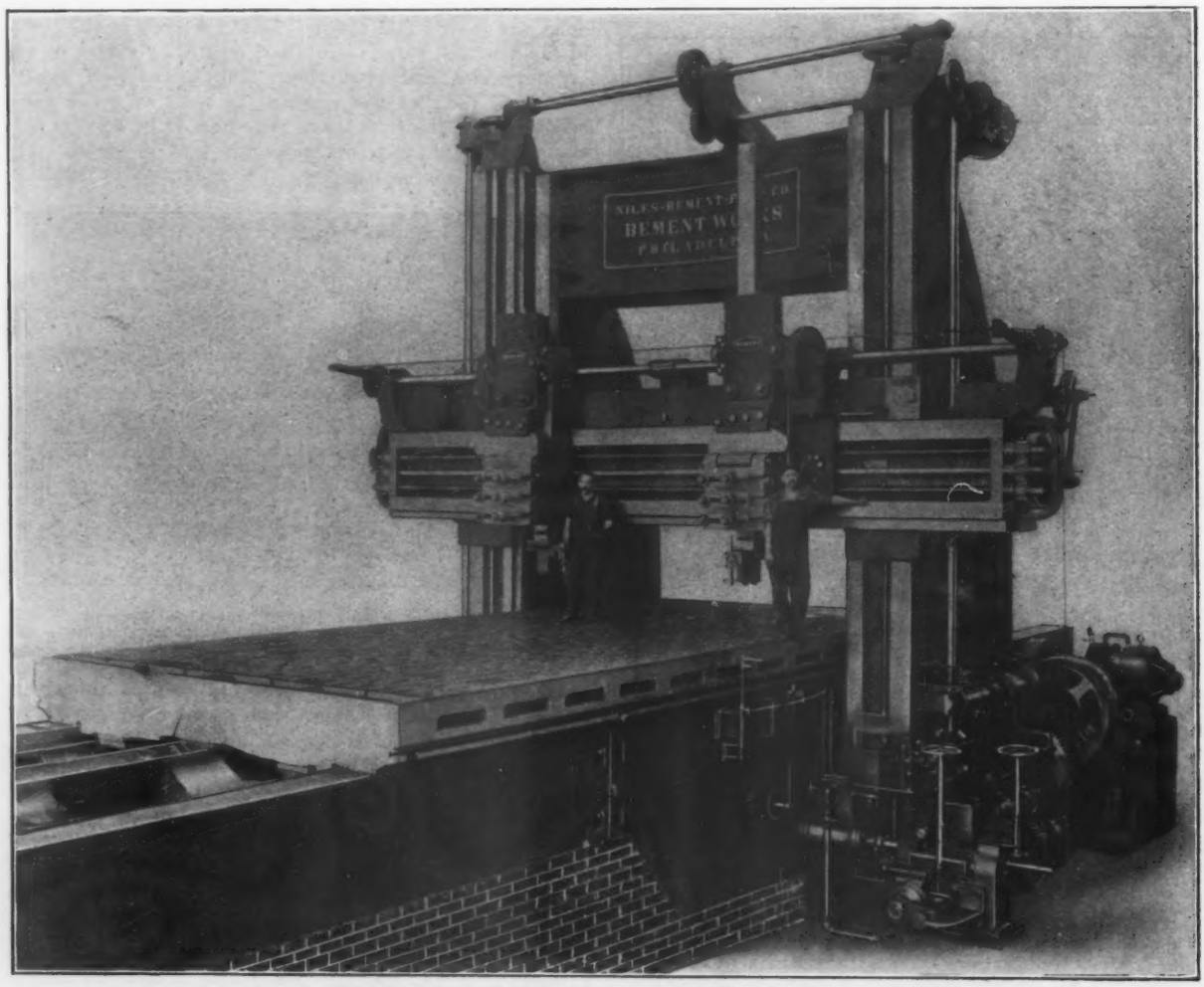


Fig. 1.—Operating Side of the Big Planer, Showing Main Driving and Feeding Mechanism.

same as that of any planer. All of the gears are of steel, and the two bull pinions are forged directly on the shaft. To increase the smoothness of the motion the pinions are cut half pitch apart, and the bull wheels, shown in Fig. 6, which are connected by a sleeve, are set to correspond The sleeve and gears revolve on a stationary shaft. To allow the gearing to be easily removed the shaft may be drawn out endwise, and the center bearing of the sleeve is capped.

Fig. 4 also shows the pneumatic feed to the cross heads. Immediately above the main gearing on the side of the upright is a cylinder with its piston rod extending to the left. This rod carries a rack engaging a gear on the adjacent vertical feed shaft, and the latter through bevel gears and a horizontal shaft drives the corresponding vertical feed shaft on the opposite upright. Variation in the amount and direction of the head feeds is obtained by adjusting the position of the

the table and connect the latter to a separate feed motion distinct from that for the cross heads. Disconnecting the table from the main drive involves merely throwing the pneumatic driving clutches to their neutral position. Figs. 2 and 5 show the slotter drive, which is similar to the main drive up to and including the pneumatic clutches. From this point it is transmitted to a vertical square shaft, and thence by bevel and spur gears to a horizontal square shaft extending along the top of the cross rail. The tumbler bearing at the center of this shaft is seen in Fig. 3. Sliding pinions on this shaft drive larger gears which are connected to and enclosed with pinions meshing the racks on the backs of the cutter bars. The sliding pinions can be thrown in or out of gear to drive the bars independently or simultaneously. A cutting speed is obtained that is practically constant from one end of the stroke to the other, and a quick return. Both cutting and return speeds can be

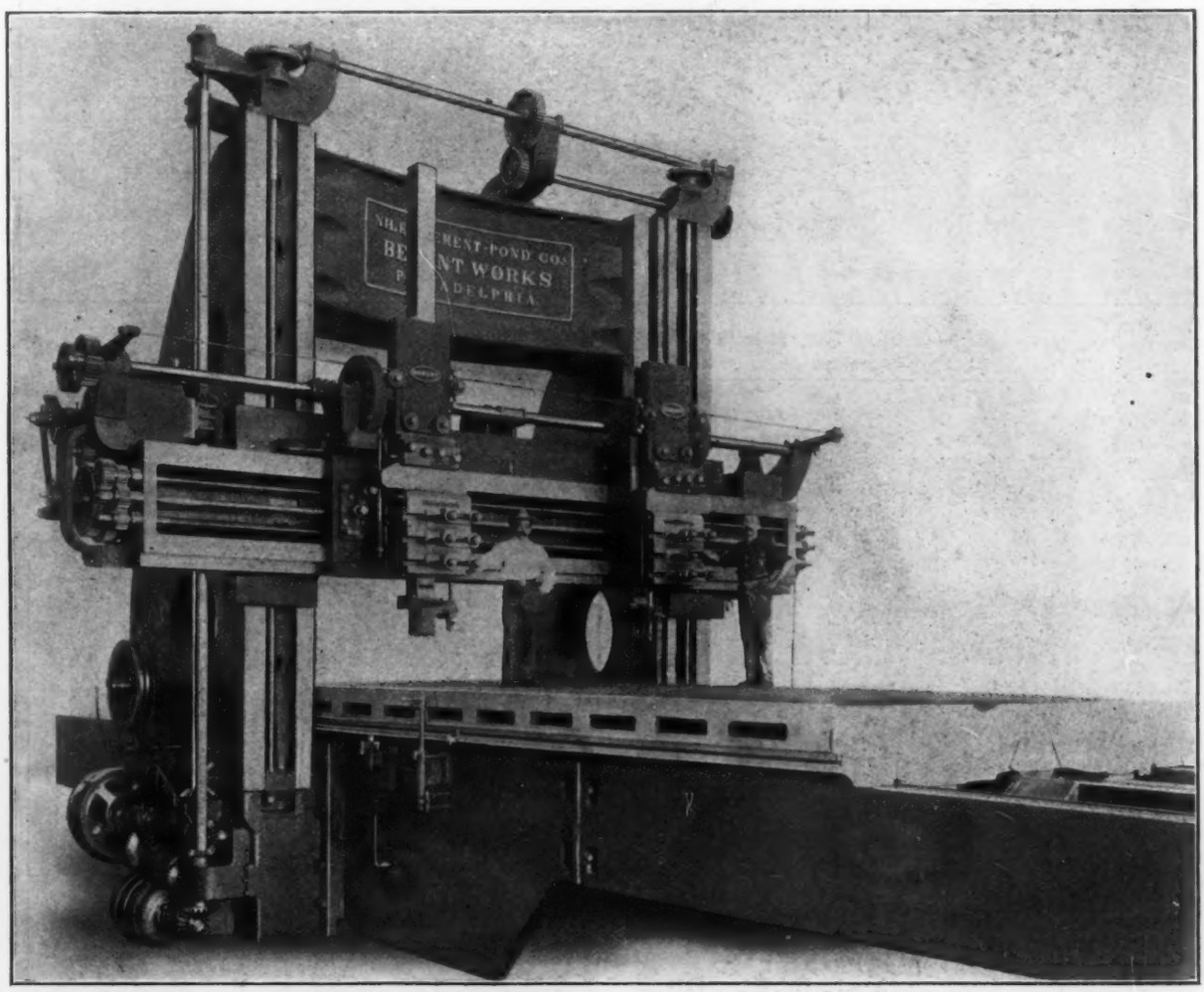


Fig. 2.—Opposite Side of Planer, Showing Slotting and Cross Planing Drive.

connecting rod pins in the crank disks at the ends of the cross rail. Graduations on the disks make it possible to obtain definite cross and vertical feeds. By using the cranks on both sides at the same time, one for vertical and the other for horizontal feed, an angular feed can be given to the tool even though the heads as a whole are not arranged to swivel. At each end of the stroke, the valve controlling the air to the feed cylinder is thrown automatically. Ordinarily this movement is taken from the main driving gearing to the table, but when slotting is being done it is taken from the slotter gearing. Closing a valve to cut off the air supply throws the feed out of action. The rear view of the cross rail given in Fig. 3, shows the feed gearing at the ends and the upper parts of the backs of the cross heads which are shown projecting above the rail near the ends.

For either slotting or transverse planing it is necessary to disengage the main driving mechanism from

changed through the motor and change gears, similarly as for the main drive, giving ranges of 18½ to 30 ft. per minute for the cutting speed, and from 57 to 71 ft. for the quick return. The length of stroke is governed by the disk shown just above the motor in Fig. 5, which is driven by a worm wheel and worm on an inclined shaft bevel gear connected to the main train of slotter gearing. Adjustable stops on the periphery of this disk can be set after the manner of dogs on the side of a planer table, to effect the reversals. The same drive is used for transverse planing for which cutting speeds from 11½ to 19 ft. per minute can be obtained and quick return speeds from 35 to 43½ ft. per minute. The bevel gears on the vertical square shaft, Fig. 5, just above the cross rail, are used for changing the drive from slotting to cross planing. When the machine is used as a regular planer, single tooth pinions, which may be seen in Fig. 3, operated by worms and worm wheels, hold the slotter bars in their extreme upper positions.

In Fig. 5 can be seen near the bottom of the square vertical shaft, a bevel gear on the end of a horizontal shaft which extends through the bed and can be connected to the mechanism operating the valve of the feed cylinder on the opposite side in front of the upright. This operates the feed to the table when slotting or transverse planing is being done. This mechanism is not in position in the view given in Fig. 4, but may be seen in Fig. 1, directly in front of and at the base of the position usually occupied by the reversing hand lever of a standard planer. At the upper end of this shaft are two sockets in which a handle may be inserted. The upper socket is the hand control of the slotter and is connected to a shaft which runs down to the bottom lever or crank. The connections can be easily traced in Figs. 1 and 2 from this lever to the curved rod on the opposite side of the bed extending back to and out through the upright to the slotter reversing mechanism

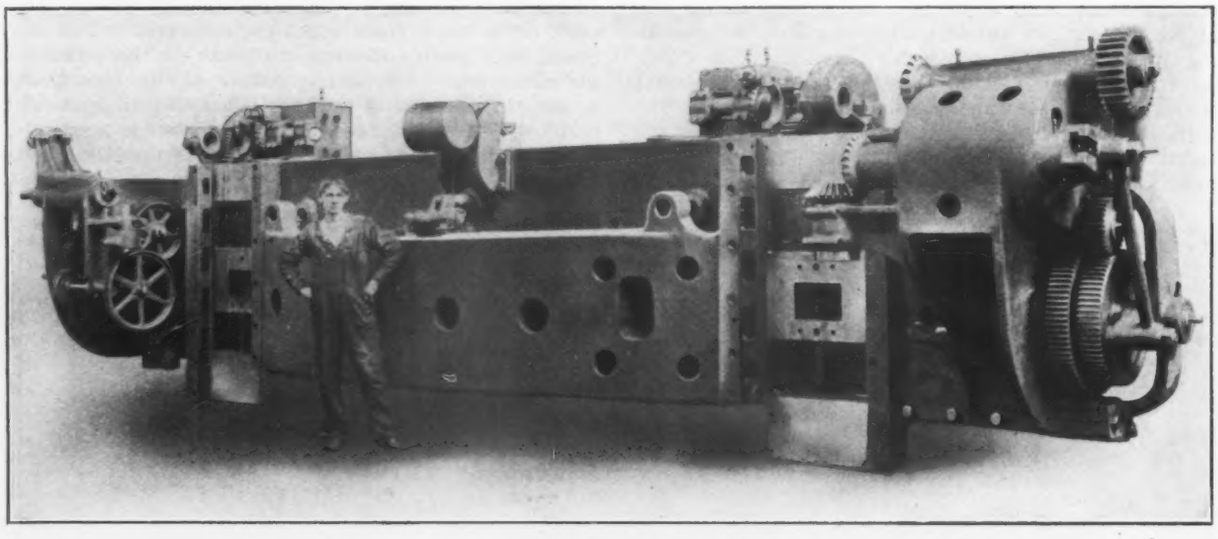


Fig. 3.—Rear View of the Cross Rail, Illustrating the Feed Gearing at the Ends.

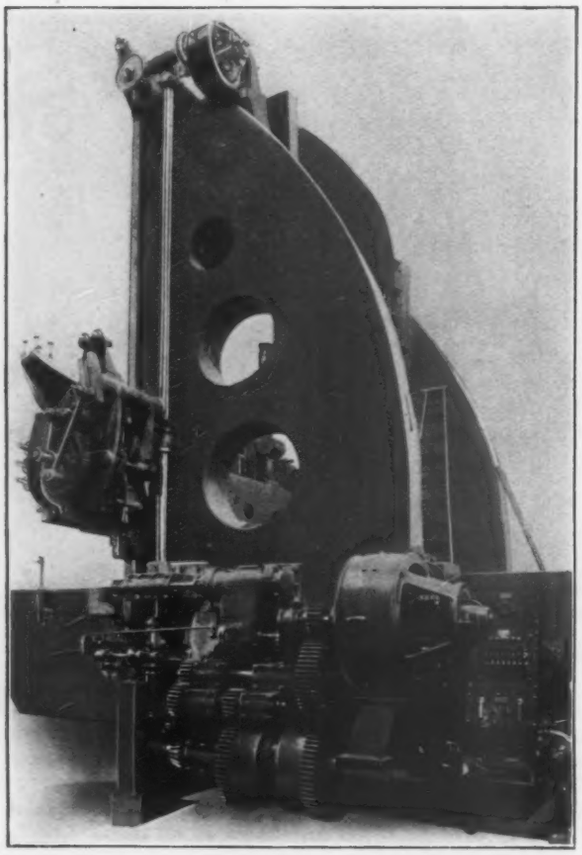


Fig. 4.—Detail of the Main Drive.—The Table Feed Mechanism Is Not Shown.

at the reversing disk. The lower socket controls the table movement in regular planing and is connected by levers and rods on both sides to the rocker shafts operated by the reversing dogs on the bed. Only one handle is furnished for each side to help avoid mistakes arising from throwing the wrong lever.

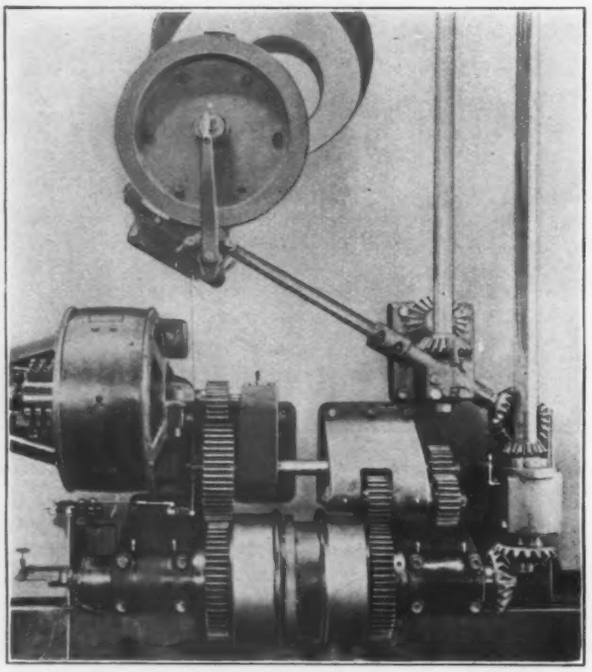


Fig. 5.—Detail of the Slotting and Cross Planing Drive on the Left Upright.

the upright. The action is practically the same as that for the cross head feed already described, except that variation in amount of feed is effected through an adjustable stop which limits the extent of the movement of the air cylinder piston. This adjustment is made by the hand wheel at the right, and the connection to the main driving works is made or broken by the left hand wheel.

In Figs. 1, 2 and 4 a vertical shaft will be seen in

The motor for the fast traverse of the heads is shown on the end of the cross rail in Fig. 4. The reversing is done through friction clutches, and a safety device is provided, which prevents throwing the fast traverse and the feed mechanism in at the same time. The cross traverse speed to the heads is 50 in. per minute. The motor for operating the rail is situated at the top of the upright, as shown in Figs. 1 and 4. This motor is connected at all times to the elevating screws and is

stopped, started and reversed electrically. The vertical speed in raising and lowering the cross rail is 26 in. per minute.

Owing to the great weight and large dimensions it was impracticable, both from a manufacturing and shipping standpoint, to make the bed or table in one piece. They were, therefore, divided to bring them within reasonable limits. The central section of the bed, which is 73 in. deep, is divided longitudinally into three parts and the two end sections into two parts, or seven parts in all. The parts are held together with taper bolts in reamed holes, and keys in keyways insure the alignment. The total weight of the bed is about 275,000 lb. The table is made in two sections, divided longitudinally in the center, and weighs about 140,000 lb. The table rests on two flat ways, near the outer edges, and one central V-way. Inside of the flat ways the table extends down a short distance to prevent any possible side movement under heavy cuts. The holes in the table for stop bolts, &c., run entirely through the upper plate, while below this is a second plate without openings, extending the full width of table for catching all chips. The chips can then be removed through the side openings of the table, which are clearly shown in Figs. 1 and 2. As these same illustrations indicate, there are finished pads on the end of the table over the V and flat ways. These

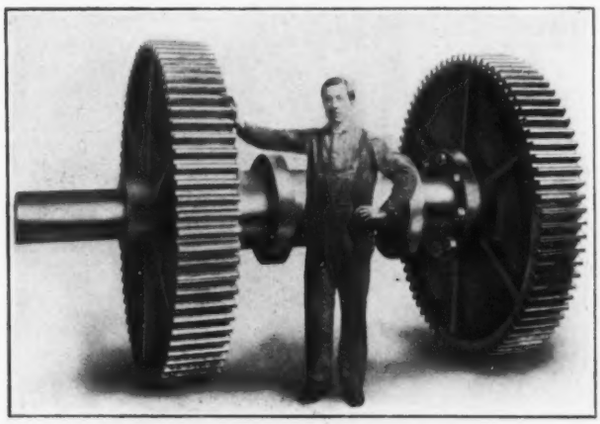


Fig. 6.—The Two Large Bull Wheels.

are to carry the heads used for truing up the ways when they are worn out of alignment. The method is as follows: The table is raised, say, ¼ in. above the ways, and is supported in this position on sliding blocks fitting the inner small auxiliary shears, which are used only for this purpose. The truing heads being fastened to the end of the table the ways are trued up from the center to the end. The heads are then placed on the opposite end of the table and the remainder of the ways finished. Near the center of the bed are pockets in the ways, in which the same truing heads are placed and the table is in its turn then planed up in the same manner. The accuracy of the finished work is dependent entirely upon the accuracy of the small auxiliary ways, and these are therefore finished and erected with great accuracy.

The elevating screws for the cross slides are firmly held top and bottom, and the nuts in the cross slides set into shouldered ends in square pockets. It is expected that this will take care of the slotter bar thrust satisfactorily, but if any loosening or trouble is experienced, arrangements have been made so that the slide can be firmly braced to the uprights. The cross heads are counterweighted and are of right and left hand construction, so that the slotter bars can be brought close together. Special tool holders are provided for the slotter bars. The outside aprons of the cross heads allow the tools to be brought very close to the edge. Each apron swivels, according to the usual practice, but in this case the adjustment is made by a worm meshing worm wheel teeth on the upper edge of the apron segment. The two hexagonal heads on the cross head slides are for the vertical hand adjustment of the tool slide and the horizontal hand adjustment of the head on the cross rail.

Railroad Building in 1907.

The record of new railroad lines built in the United States in 1907, as compiled by the *Railroad Gazette*, shows the effect of antirailroad legislation in various States, and the consequent difficulty in borrowing money. At the close of 1906 the outlook was for an increase in 1907 over the railroad construction of that year. The figures show 7½ per cent. less than for 1906, however, or 5212 miles of steam railroad, against 5623 miles. In the early part of 1907 the difficulty of getting labor and supplies to carry on authorized work was a factor. The statistics do not include second, third or fourth track, sidings or electric lines.

The Portland & Seattle, a joint low grade line of the Great Northern and the Northern Pacific, from Kennewick, Wash., west to Vancouver, 220 miles, was the longest single stretch of new road built. On the St. Paul's Pacific extension 39 miles of track were laid in 1906 and 298 miles were added in 1907, leaving between 1100 and 1200 miles yet to be built to finish the line to Seattle. The Kansas City, Mexico & Orient built 47 miles in Oklahoma, 25 in Texas and 18 in Mexico. Over 900 miles are yet to be built to finish the line from Kansas City through to Topolebampo, on the west coast of Mexico, On the Western Pacific all of the road in Utah, 122 miles, has been finished; in Nevada 39 miles have been laid, and 102 in California, leaving 577 miles yet to be built.

In Canada, the Grand Trunk Pacific has full surveys from Moncton, N. B., west to Winnipeg, Man., 1800 miles, and has let contracts for 852 miles on this section. Track has now been laid on about 300 miles west of Winnipeg. The Canadian Northern recently finished a connecting line from Brandon, Man., west to Regina, Sask., 175 miles, and has projected a large number of other extentions. The Canadian Pacific has finished an extension from Strassburg, Assin., to Saskatoon, 91 miles, so that it now has a through line from Winnipeg west to Saskatoon. It has work under way in Western Canada on several hundred miles additional. In Mexico the Southern Pacific built 205 miles on the west coast, and is pushing work from San Blas, which is on the Kansas City, Mexico & Orient, down the west coast of Guadalajara, 650 miles.

New main track mileage is reported in 44 States and Territories, including Alaska, with 90 miles of new track. Louisiana, which was third in 1906, was first in 1907, with 384 miles. Texas, South Dakota and Washington came next in order, each with between 340 and 320 miles. In 1906 Texas was first with 635 miles. The largest decrease in 1906 was in North Dakota, where only 247 miles were built, as compared with 521 in 1905. In addition to the States which lead the list, Alabama, Arkansas, Georgia, Idaho, Indiana, Minesota, Mississippi, Montana, North Carolina, North Dakota, Oklahoma, Pennsylvania, Virginia, West Virginia and Wisconsin each built over 100 miles of main line in 1907. No new mileage was reported in Connecticut, Delaware, Iowa, Massachusetts, New Hampshire, Rhode Island and Vermont.

The number of miles built in Canada was 590, a decrease of nearly one-half as from 1906, when 1007 miles were built, mostly by the Canadian Northern and the Canadian Pacific. The number of miles built in Mexico was 333, as against 297 in 1906.

According to statistics compiled by the *Railway Age*, the total number of miles of new track laid in 1907 was 5730, of which 422 miles were in Louisiana, 341 in Florida, 385 in South Dakota, 314 in Texas and 311 in Washington. In Canada last year 723 miles were built and in Mexico 349 miles.

In a discussion at the recent meeting of the Society of Naval Architects and Marine Engineers some advantages of the motor boat over the steam launch for naval service were brought out. In view of improvements in design and construction the gasoline engine, when well built and in the hands of a man trained for the work, was considered sufficiently reliable for naval use. The saving in space in the use of the automobile motor is 20 to 25 per cent. over that required for the steam launch.

A Dill Slotter with Right Angle Drive.

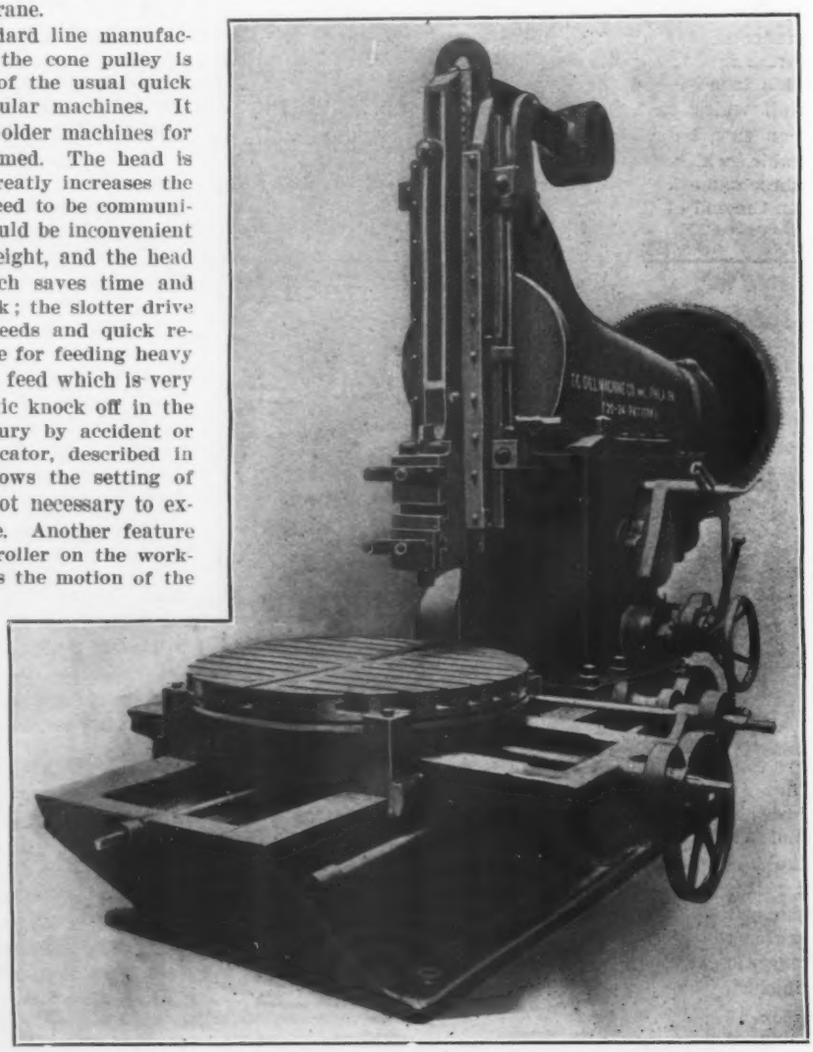
The principal distinction between the machine illustrated and other slotters which have been manufactured by the T. C. Dill Machine Company, Philadelphia, Pa., is the arrangement for the right angle drive. The receiving cone pulley is on the side opposite the working side of the machine, on a shaft, which is perpendicular to the usual cone pulley shaft. This slotter is believed to be the first provided with a right angle drive, and because of it can often be located to better advantage in a shop. The line shaft usually runs lengthwise of the shop, and it is very convenient to have a slotting machine, particularly when as large as the one illustrated, 20-24 in., set crosswise of the shop so that the upper part of the machine may not be in the way and the work can be handled by a traveling crane.

The slotter is similar to the standard line manufactured by this company, except that the cone pulley is mounted on what is a continuation of the usual quick traverse shaft on the company's regular machines. It also has the features common to the older machines for which particular advantages are claimed. The head is moveable from front to rear, which greatly increases the range of the machine, allowing the feed to be communicated to the head at times when it would be inconvenient to feed the work on account of its weight, and the head also has a quick traverse gear which saves time and labor in adjusting the tool to the work; the slotter drive permits high and uniform cutting speeds and quick return; an intermittent feed is available for feeding heavy work at high speeds and a continuous feed which is very desirable for some work; an automatic knock off in the feed mechanism protects it from injury by accident or careless handling, and a stroke indicator, described in *The Iron Age*, January 31, 1907, shows the setting of the stroke adjustment so that it is not necessary to experiment in obtaining the proper one. Another feature of advantage is the hand wheel controller on the working side of the machine which arrests the motion of the machine when the power has been turned off, and also adjusts the ram a portion of the stroke. The machine has six changes of speed, three being obtained by the three step cone pulley and this range doubled by gearing. The tool post which is provided in the relief apron is handy when changing tools. The machine is powerfully geared, being stated to have about double the usual ratio and may be provided with either belt or motor drive, special designs being built for each.

The maximum stroke of the machine is 25 in.; the longitudinal movement of the table, 48 in.; transverse movement of the table, 40 in.; table diameter, 44 in.; movement of the head, 30 in.; greatest distance from the table to the head, 24½ in., and the adjustment of the ram, 32 in. The machine will cut to the center of a 92-in. circle and to the outside of a 108-in. circle. The usual changes of speed provide a range from 5½ to 27 strokes of the ram per minute. The feeds of the table per stroke vary from 0.009 to 0.138 in., and the circular feeds per stroke at a diameter of 12 in., from 0.005 to 0.11 in. The gear ratio between the cone pulley shaft to the crank shaft is 24 to 1. The feed of the head per stroke ranges from 0.00345 in. to 0.069 in. Where the machine is motor driven it requires a motor of 10 hp. The weight of the machine without the motor is 24,000 lb.

The traveling head, which is a distinguishing feature of the Dill slotters, is also arranged to be clamped rigidly in any position desired. On work which does not need an extended reach the cutting bar or ram may be brought back close to the column where the greatest possible rigidity is secured and the best view of the work, and the table may be brought forward to its limit to machine the outside of work of the maximum diameter. When the head is extended forward the standard behind the column, mounted on an extension of the bed, is in sliding contact with the head, giving the frame an additional support to withstand the cutting thrust.

The quick traverse gear is for moving the head and compound table in all directions quickly by power. It enables the setting of work by power instead of by hand as is the usual method and is effective in the saving of time and labor. On duplicate work it is an advantage as it brings the parts back to their original position before starting the next operation. The quick traverse is operable with the machine at rest or in motion. It is simply a direct connection between the driving shaft and the feed gears, giving a more rapid movement than is effected through the regular feed mechanism.



A 20-24 In. Slotter with Right Angle Drive, Built by the T. C. Dill Machine Company, Philadelphia, Pa.

The quick return to the head is obtained by the use of an eccentric mounting of the driving gear on the crank shaft, and the connection of this gear through a crank and link with the shaft. The result is a more uniform cutting stroke, and a quick return which begins action at the lower end of the stroke where usually there is the greatest dwell. The feed can be changed to any portion of the stroke. The safety device in the feed mechanism is also useful when forming duplicate work as with the aid of stops the feed may be thrown out at any predetermined position. The guide which supports the cutter bar can be raised or lowered by convenient crank handles to the position in which it best supports the ram.

The motor driven machines may be arranged either for constant speed or variable speed motors. For the

former a mechanical speed box is supplied which gives three changes, these being in turn doubled by the regular back gears, making six changes in all, as in the belt driven machines. The variable speed motor has a range from 3 to 1 and gives the same number of changes in connection with the back gears without the employment of a speed box.

The Gayley Dry Air Blast at Warwick Furnace.

The results obtained during the past few months at the No. 2 Furnace of the Warwick Iron & Steel Company, at Pottstown, Pa., show what can be done with dry air blast on a furnace, which, under ordinary conditions, would have been blown out. Edgar S. Cook, the president of the company, has furnished some data respecting the use of the Gayley dry air blast at this furnace. The furnace had practically completed its second blast, and by reason of the worn condition of the lining and irregularity of working would have been blown out in August, if the dry air blast plant had not been ready to operate.

It was expected that the use of dry air would enable the management to prolong the life of the furnace sufficiently to complete certain profitable contracts for basic iron, and such proved to be the case. It is well known that the manufacture of basic iron in a merchant furnace is quite a different proposition from making it in a furnace as an adjunct of a steel works. In the merchant furnace the iron must be clearly within specifications, whereas at the steel works furnace a wider latitude in composition is permissible, since it is more economical to mix in the off grades rather than remelt.

Prior to the introduction of dry air the furnace had been working very irregularly, and Mr. Cook has preferred to make a comparison of dry air with natural air at contemporaneous periods in each blast, as representing similar furnace conditions resulting from a wornout lining. He advises as follows: "The No. 2 Furnace is still in operation, notwithstanding that we have stopped a number of times to patch up the top. The stock line has been cut out so much that the brickwork around the hopper has fallen in on several occasions, first one section then another, so that all the gas made by the furnace would pass to the atmosphere through these openings, instead of being taken by the flues to the boilers and hot blast stoves. We have been able to patch up these openings with plates and concrete, so as to keep the furnace running. Our idea in running, is to accumulate sufficient basic iron to ship on contracts while the furnace is being relined." The comparative working statement shows as follows:

First blast blown in October 8, 1901. Blown out June 4, 1904.
Natural air.

	Product per week.	Per ct. of basic iron	Pounds of coke per ton of iron.	Yield of ore. %	Pounds of ore per pound of coke.	Hot blast temp. Deg.F.	Stops per week. Min.	Product for blast. Tons.
1904.	Tons.	grade.						
April	2,660	54	2,716	55.6	1.48	971	560	.....
May	2,634	46	2,745	55.4	1.54	1,087	238	328,251
Second blast blown in November, 1904. Dry air.						December 1, still in operation.		
1907.								
Sept.	2,638	78	2,503	54.4	1.76	959	441	.....
Oct.	2,927	82.2	2,501	55.9	1.70	962	336	.....
Nov.	2,735	80.4	2,339	54.8	1.93	1,002	336	546,567.16

The record for the past four weeks shows as follows:

Week ending—	Product. Tons.	Per cent. of basic grade.	Fuel consumption per ton of iron. Pounds.	Ore yield. Per cent.
November 30	2,833	98.2	2,188	55.06
December 7	2,787	81.8	2,347	56.6
December 14	2,973	77.1	2,320	55.8
December 21	2,679	90.6	2,380	52.3

In the week ending December 21, the furnace was standing all day Sunday, December 15, repairing top, and the stock line was cut back so badly that brick dropped away from the hopper.

The weekly average of the two periods shown above is as follows:

	Weekly product. Tons.	Coke per ton iron. Pounds.	Per cent. of basic iron grade.
Natural air	2,647	2,735	50.0
Dry air	2,779	2,414	81.9
Difference	132 increase.	321 decrease.	
Showing a percentage of.	5 increase.	11.7 decrease.	

Considering the very bad physical condition of the furnace, Mr. Cook considers these records as being exceptionally good. He further advises that when the silicon in the metal fell as low as 0.10 per cent., with natural air, the sulphur would be so high as to make the iron unmarketable and would have to be remelted, but under similar conditions with dry air the sulphur would not exceed 0.04 per cent.

Wherever the dry blast has been used there are found to exist many collateral advantages the importance of which has perhaps not been generally recognized. The remarkable increase in percentage of the desired grade of metal is significant to merchant furnaces, and especially to those engaged in the foundry trade, where the difference in grade represents considerable profit or loss. The life of this furnace has been extended through the use of dry air and on a basis of economical working. The results obtained at the Isabella Furnace show an increased life on a lining of 32 per cent.

Under present conditions of trade, when economies of the first order command attention, the advantages of dry air blast rank first in economical importance, as it makes a greater return on the investment than any other adjunct of furnace working. The Gayley dry blast process is no longer an experiment, for it has demonstrated its efficiency, both in this country and abroad. The question is being increasingly asked, "why are the captains of the iron and steel industry so dilatory in installing a meritorious and well demonstrated process which makes for such economies?"

The Lisk Mfg. Company Fails.—The largest petition in bankruptcy ever filed in the United States District Court at Buffalo was placed on record December 27 against the Lisk Mfg. Company, Ltd., of Canandaigua, N. Y., the capital stock of which is $2,000,000, all paid in. At the same time a petition was filed against the Reed Mfg. Company of Newark, N. Y., the capital stock of which is $500,000, owned by the Lisk Company. The total indebtedness of both companies is upward of $1,500,000. Both companies have about $1,000,000 of manufactured goods and stock on hand. Immediately following the filing of the two petitions application was made for the appointment of receivers, in order to prevent a sacrifice of the business and property. The court appointed as receivers Frank H. Hamlin of Canandaigua, Frank H. Garlock of Newark, and Henry E. Boller of Buffalo. The receivers are required to file a bond of $100,000 upon each application and are authorized and directed to continue the business. Under their management it is believed the indebtedness will be fully paid and the property saved to the stockholders. The Lisk Company manufacture enameled and tin house furnishing goods and cooking utensils. The present condition of the money market is given as the cause of the failures.

The formal transfer of the property of the National Wire Corporation, New Haven, Conn., to the American Steel & Wire Company has been made. The new owner does not intend to start up this plant for the present, unless business shall take an unusually sharp turn for the better. There would naturally be no reason for doing so. Neither has the company made plans to increase the works at New Haven, a report quite widely circulated in the daily press. It may be stated with emphasis that the situation at New Haven, from its manufacturing and engineering side, has been given little consideration by the American Steel & Wire Company. The location is esteemed a very desirable one, being so close to the New York market, and exceptionally well situated for the export trade. It is believed that eventually the works will become an important factor in the company's manufacturing operations, but for the immediate future little in the way of enlargement may be looked for.

The Chandler Clutch-Driven Planer.

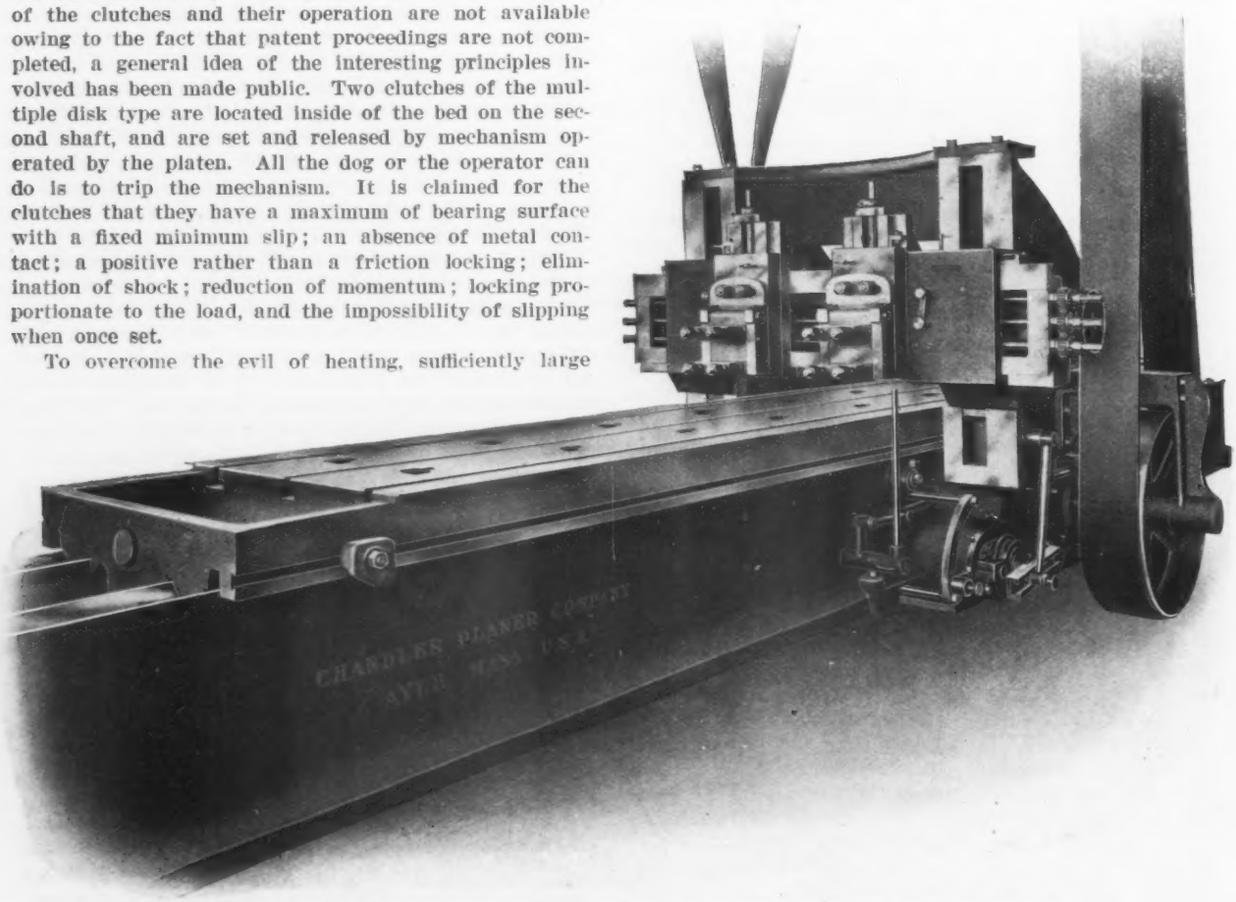
The 42-in. planer shown in the illustration is unique in that the drive to the table is transmitted through mechanical clutches. Designed for frog and switch work or other heavy duty, it is a machine of great power as will be seen in the fact that the drive is through a 10-in. double belt running at a speed of 1860 ft. a minute, with ratio of 93 ft. of belt travel to 1 ft. travel of the platen. At a cutting speed of 20 ft., the machine has removed from a 40 point carbon steel forging a chip ¾ in. deep with ¾ in. feed. It was built by the Chandler Planer Company, Ayer, Mass.

The characteristic feature of this planer is the clutch mechanism, through which power is transmitted to drive the table alternately forward and back. While details of the clutches and their operation are not available owing to the fact that patent proceedings are not completed, a general idea of the interesting principles involved has been made public. Two clutches of the multiple disk type are located inside of the bed on the second shaft, and are set and released by mechanism operated by the platen. All the dog or the operator can do is to trip the mechanism. It is claimed for the clutches that they have a maximum of bearing surface with a fixed minimum slip; an absence of metal contact; a positive rather than a friction locking; elimination of shock; reduction of momentum; locking proportionate to the load, and the impossibility of slipping when once set.

To overcome the evil of heating, sufficiently large bearing surfaces are employed, consisting of multiple disks, alternately keyed to the shaft and shell of the clutch, all moving laterally. The closing of the clutch presses the disks together. In certain general features the clutch resembles the type which is coming into common use on automobiles. The shell of the clutch, which transmits the drive, is a case within which the disks run in a bath of oil. The oil not only lubricates and reduces the tendency to heat, but also serves as a cushion to give to the clutch a soft, smooth engagement. The planer has been taken down after two months operation, including severe tests of endurance and of heavy reduction, and it is stated that the disks show no signs of heating and the tool marks are still visible. Examination of the disks showed that a film of oil is always interposed between the clutch faces and upon this fact is based the contention that as long as the disks do not come into actual contact there can be no wearing and heating. The clutches being two in number, one engaging with the cutting belt shaft, the other with the reversing belt shaft, one clutch is idle while the other is working, giving each a chance to rest and become thoroughly lubricated between its engagements.

The two belts are on opposite sides of the planer, that of the reverse being crossed. Each pulley is mounted on a short shaft, the two being in line, and each shaft also carries a pinion. The pinion meshes a gear on the shell of its corresponding clutch and the clutches are mounted upon the same shaft. When the driving clutch is engaged the clutch shaft revolves for the forward movement of the platen; when the reverse clutch is operating the shaft takes the opposite motion. When the lever operating the clutch, actuated by dogs on the platen, is thrown to either extreme of its movement, the table is driven in one or the other direction, and when the lever is manually brought to its neutral vertical position, neither clutch is engaged and the table is idle. On the end of the clutch shaft, away from the operator, is mounted a gear, meshing a pinion on the third shaft which drives the bull gear.

Each main clutch has what is called an auxiliary clutch, which is also on the clutch shaft. Its function



A 42-In. Planer with Mechanical Clutch Drive, Built by the Chandler Planer Company, Ayer, Mass.

is to engage the main clutch by bringing its disks together. When one of the main clutches is disengaged it revolves idle with its auxiliary, at the same speed. When the drive, either cutting or reversing, is to operate, the planer dog trips the shifting mechanism which engages the auxiliary clutch, causing it to grip the shaft, retarding its motion so that it runs at a slower speed than the main clutch. The difference in speed between the two causes the main clutch to tighten. This differential insures a locking in proportion to the load, for it is apparent that if there is a slip caused by a sudden accession of load the differential again asserts itself, causing the main clutch disks to take a tighter hold. The amount of slip before locking is accurately determined by a timing mechanism between the primary and main clutch.

Supplementing the main and primary clutches is a mechanically operated device, the details of which are not revealed, which insures a positive engagement of the primary clutch, leaves nothing to a mischance of dogging and provides a proper margin of safety to meet all conditions of varying platen load. The difficulty of reversing is reduced as momentum is decreased, so that the smaller the weight and the lower the velocity the greater the advantage in this respect. In the clutch planer this is accomplished to a very material extent

by mounting the clutches on the slower running second shaft, and designing the clutch so that the only parts that reverse are the disks keyed to the shaft. The clutch cases and all other operating mechanism move constantly in one direction.

The planer is a 42 x 20 in. x 20 ft. machine and weighs about 30 tons, being of massive construction throughout. It was fashioned of the frog and planer type in order to test the clutches for the severest class of work. The cutting speed is 20 ft., with a return of 4 to 1. The cutting belt, as stated, is 10 in. The reversing belt is 5 in. wide, and runs at a speed of 3900 ft. a minute. Most of the tools used in the tests were 2½ x 3 in. in size. The planer removed the side of the head, up to the web, on a pair of extra hard 70-lb. relay switch points, cutting back 9 in. in less than 6 min., and the company expects to be able to reduce this time at least 30 per cent. The planer has been run for hours on a 14-in. stroke without showing signs of injurious heating or wearing. Between 6 and 7 hp. is required to run the planer light at a cutting speed of 20 ft. with return speed of 80 ft. The reverse requires about 20 hp. On severe cutting loads the clutches have demonstrated their ability to hold without slipping under a load of over 50 hp. according to the builders' tests.

The company claims that the planer secures a greatly increased cutting efficiency because of its steadiness. The contention is made that while most frog and switch manufacturers have claimed to have reached the limit of their tool steels with less power than used in the new clutch planer, this is not the case, because of the effect of shock upon the molecular structure of steel, especially at high temperatures. Consequently the elimination of shock by increased steadiness increases the efficiency of tool steel to carry out the reduction. This is demonstrated, according to the argument, by the fact that after a tool is forged it has no cutting capacity until the molecules are permitted to readjust themselves by the process of annealing. If the planer vibrates and chatters while the tool is in the chip, there takes place in the tool, especially at its cutting edge, a disturbance practically the same as that which results from forging.

Planers with pneumatic clutches operated by compressed air have already proved successful, but so far as can be learned this planer is the first to be operated by mechanical clutches, without the assistance of belt shifting mechanism. Many attempts, it is reported, have been made to secure such a machine, but this is believed to be the first planer of its type offered for commercial work. Clutches operated by the direct action of the platen have proved impracticable, the mechanism being too positive under some conditions. The career of this new Chandler planer will consequently be watched with unusual attention by builders and users of the heavier type of planing machines.

Steel Rail Breakages in France.—Owing to frequent steel rail breakages due to hidden defects, the French railroad companies recently ordered a thorough inspection of their principal tracks, particularly at the joints where, owing to the fish plates, it is not easy to see the state of the web. The London *Times Engineering Supplement* says such inspections are now made every other year on the secondary lines and once every three months or more frequently on main lines. Steel hammers are used with two round heads and a long handle. If the rail is sound the hammer rebounds and the ring of the metal is clear, while at the least defect the shock is dull and the hammer does not rebound. When a rail is discovered that is thought to be defective the fish plates are taken off and further investigation made. If necessary the rail is renewed. In other cases the rail is marked in order that it may be frequently examined by the plate layers on their rounds. In addition to the periodical inspections, bonuses are paid to ordinary plate layers who discover breakages or cracks, either hidden or visible.

George H. Wadsworth, superintendent of the Falls Rivet & Machine Company, Cuyahoga Falls, Ohio, read a paper on "Foundry Cores, Core Sand and Core Making Machinery," at the meeting of the Chicago Foundry Foremen's Association, held at the Lewis Institute, Chicago, December 18. In this paper Mr. Wadsworth went very fully into the composition and methods of making cores, and exhibited and described the line of core machines of his invention which are manufactured by the above named company. These machines were illustrated and described in *The Iron Age* of January 10, 1907.

The Prevention of Coal Mining Accidents.

A timely report, in view of recent appalling accidents in coal mines, is that just issued by the United States Geological Survey as Bulletin No. 333, entitled "Coal Mine Accidents: Their Causes and Prevention," a preliminary statistical report by Clarence Hall and Walter O. Snelling of the technologic branch of the Survey. This report is the direct result of an order from the Secretary of the Interior, dated June 10, 1907, transferring to the Geological Survey the general supervision of the work of the coal mine inspectors in New Mexico and Indian Territory.

In endeavoring to carry out the suggestions of the Secretary relative to the improvement of mining conditions and the prevention of accidents in the coal mines of the Territories, a number of examinations of the more dangerous mines of Indian Territory were made by Clarence Hall, Samuel Sanford and Rollin T. Chamberlin, and Prof. J. A. Holmes, the expert in charge of the technologic branch. Other and more extended examinations in both Indian Territory and New Mexico have been planned. Meanwhile, Mr. Hall and his associates have been investigating the nature, extent, causes and results of a number of disastrous coal mine explosions in several of the States. These studies have been carried on in connection with the general investigations of the waste and destruction of coal in mining operations. In connection with all these investigations, and with a view to determining the practicability of preventing coal mine explosions and improving mining conditions, Mr. Hall, with the assistance of Walter O. Snelling and under the advice of Prof. C. E. Munroe, began an inquiry concerning the nature and extent of such explosions and the methods employed in the United States and foreign countries to prevent their occurrence. The results of these inquiries are embodied in the publication named.

The authors point out that the increase both in the number and seriousness of mine explosions in the United States shown in the past may be expected to continue unless most energetic measures are taken to counteract the prevailing tendency. With the depletion of the thicker and more favorably situated seams of coal, thinner and less regular seams must be worked. This factor will undoubtedly be of the greatest importance within a comparatively few years and the natural result will be to increase greatly the death rate. The rising price of timber will have the effect of decreasing the number of props used and thus increasing the chance of accidents from falls of roofs and coal, which were the direct cause of 50 per cent. of the deaths in mines in 1906. The varied nationality of the miners is also a factor to be reckoned with. At the Monongah mine, which was visited by Mr. Snelling just after the accident, signs printed in seven different languages were placarded on the walls. A large proportion of the foreign born miners are unable to understand English, and a still larger number are unable to read or write the language. The reckless disregard shown by some of the inexperienced men for their own safety and that of others can be restrained only by rigidly enforced laws.

Curtailment of production is being enforced in other industries as well as in the iron and steel trades. Under the leadership of the Arkwright Club of Boston the cotton manufacturers are arranging for a suspension of operation of 25 per cent. of the working days between the present time and March 1, which will amount to 16 days. It may assume the form of a four days' working schedule per week.

A Special Gantry Crane Dredge.

Built by Pawling & Harnischfeger for the Utah Copper Company.

When in full operation the Garfield plant of the Utah Copper Company turns out every 10 hr. about 300 tons of finely screened copper concentrates. To handle this immense amount of product rapidly and economically the special electric gantry crane dredge illustrated in the accompanying engravings was furnished by Pawling & Harnischfeger, Milwaukee, Wis.

From the concentrating plant the finely screened concentrates, which weigh approximately 150 lb. per cubic foot, are sluiced with water to the concrete tanks that are served by the dredge, as shown in Fig. 1. The tanks are arranged in series side by side, and each is 22 x 16 x 11 ft. deep; that provides a storage capacity of about 275 tons in each tank, and there are six or eight of them. The concentrates settle in the tanks, while the water flows off from one to the next through channels in the top of the partition walls until it is perfectly clear when it is run to waste. When a tank is filled the surplus water is pumped from the depressions in the surface of concentrates, and as much as can conveniently be extracted is drained through a small filter in the bottom of the tank. The service of the gantry, which travels on rails laid along the outer edge of the tanks, is to dig the accumulation which has precipitated and convey it to gondola cars standing on tracks alongside of the tanks.

Fig. 1.—The Electric Gantry Crane Dredge as Installed for the Utah Copper Company by Pawling & Harnischfeger, Milwaukee, Wis.

The gantry and bridge are of the usual construction for cranes of this type, with the exception of the provision made for supporting a corrugated iron housing extending the full length of the bridge. The operator's cage is also inclosed, but is provided with a swinging sash that may be opened if desired.

The trolley and the method of operating the clam shell bucket are the particular features deserving description. Two views of the trolley on the partly assembled crane before the housing was added, as it appeared on the floor of the builder's erecting shop, are given in Figs. 2 and 3, and present very clearly the operating mechanism and the attached operator's cage. The cage is provided with three controllers for the three motors which respectively operate the crane travel, the trolley travel and the hoisting, and two quadrant levers for operating the hoisting and dumping brakes, I and K, and one operating lever for the friction clutch L. The hoisting machinery consists essentially of the hoist motor D, which has an automatic electric brake, a motor pinion and gear, a ratchet and pawl, N, for sustaining the load, and a main pinion and drum gear, O. The hosting drum P runs free on its shaft, except when engaged with the wood lined cone friction clutch, L, that is keyed to the same shaft. The dumping drum Q is driven by the slip gear R. Both drums are equipped with wood lined band brakes, I and K. The trolley drive and gearing is plainly indicated in the illustrations and needs no explanation.

The operation is as follows: After the clam shell bucket has been lowered open into the stockpile and settled to take its load, the clutch L is thrown in and the motor D started. This causes the bucket to close and rise, and when it reaches the desired hight the motor D is stopped, the brake I applied and the trolley run out to the discharging point. Then the clutch L is disengaged and the brake I released until the bucket has descended to the discharging level, when the brake K is applied and the brake I being released the load is dumped. After this the trolley is run back to the stockpile, the brake K is released and the bucket is again lowered into the pile, thus completing the cycle.

The concentrates pack very solidly in the tanks and are exceedingly hard to dig, the bucket filling to only about 60 per cent. of its capacity. The dredge was rated to handle 30 tons of wet concentrates per hour, but it has been demonstrated to have a capacity in excess of this requirement by loading at the rate of 100 tons per hour. The information relating to the duty of this machine was furnished by D. C. Jackling, vice-president and general manager of the Utah Copper Company.

On about 75 per cent. of the city lines of the Montreal Street Railway steel cross ties of trough section, placed 6 ft. on centers, have been used. There is a concrete

beam under each line of rails, and the usual concrete foundation for the pavement between the beams.

The Indianapolis & Louisville Traction Company has recently put into service between Scottsburg and Seymour, Ind., a 1200 volt, direct current, overhead trolley electric railroad.

A traveling tower crane having the unusual working radius of 55 tons at 58 ft. from the pivot, has been installed on the docks at the harbor of Santa Cruz, on the island of Teneriffe. The 20-ft. tower section is carried on six legs, each traveling on a four-wheel truck. The crane member is a double truss structure, 138 ft. long, overhanging 105 ft. from the pivot to the housing end, and 33 ft. in length from the pivot to the counterbalance. A 54-hp. electric motor is used for hoisting and moving the tower, a 15-hp. motor for revolving the crane and a 30-hp. for the trolley.

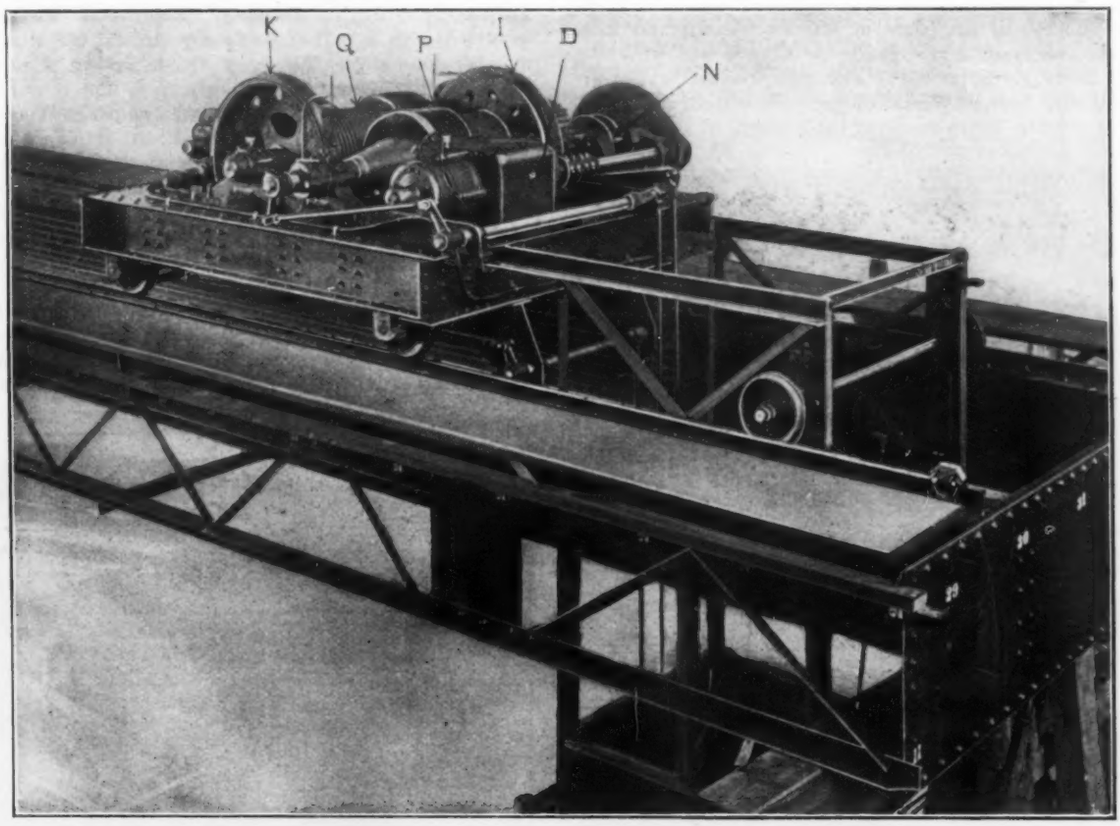


Fig. 2.—The Trolley and Operator's Cage with the Housing Removed.

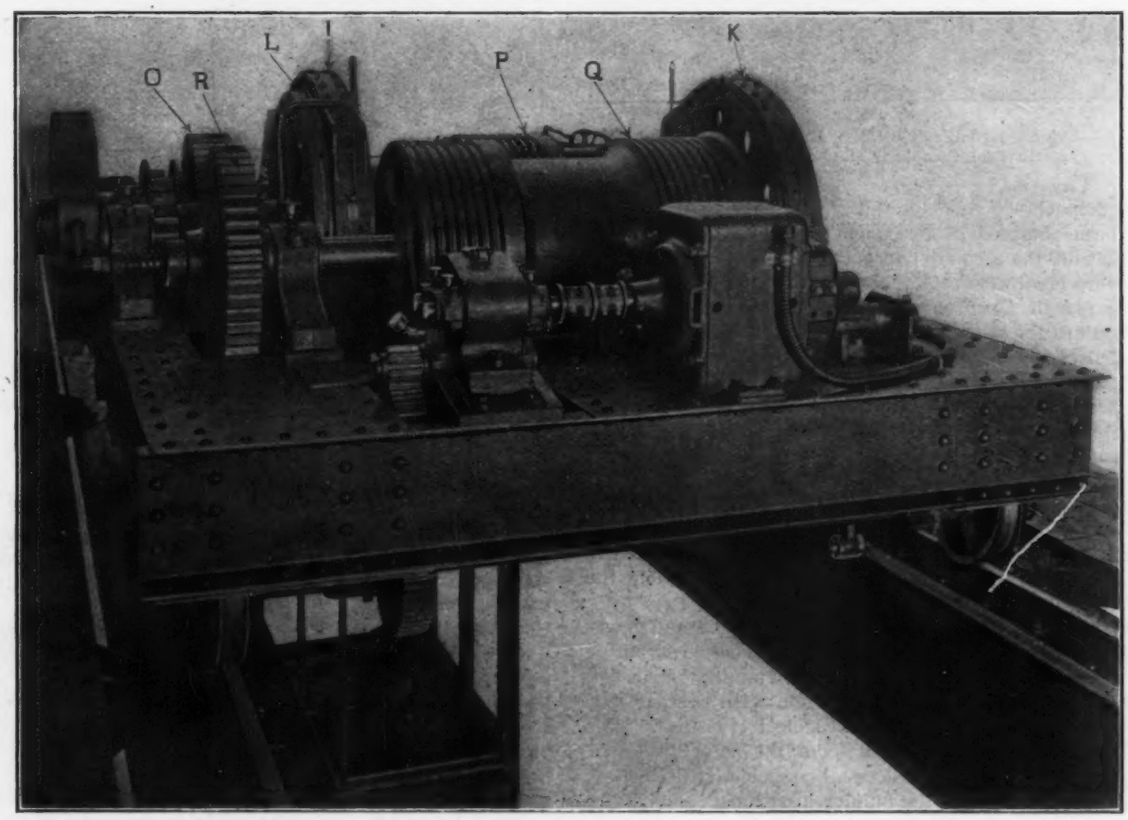


Fig. 3.—Another View of the Trolley, Showing the Trolley Travel Motor in the Foreground.

The Shepard Electric Hoists.

Speaking comparatively of electric hoists in general, it might be proper to say that the two most prominent features of the Shepard electric hoists built by the General Pneumatic Tool Company, Montour Falls, N. Y., are accessibility of all parts of the mechanism and interchangeability of many parts in these hoists with similar parts in the Shepard electric traveling cranes and pneumatic hoists. While compactness is desirable it was considered by the designer of these hoists to be of second-

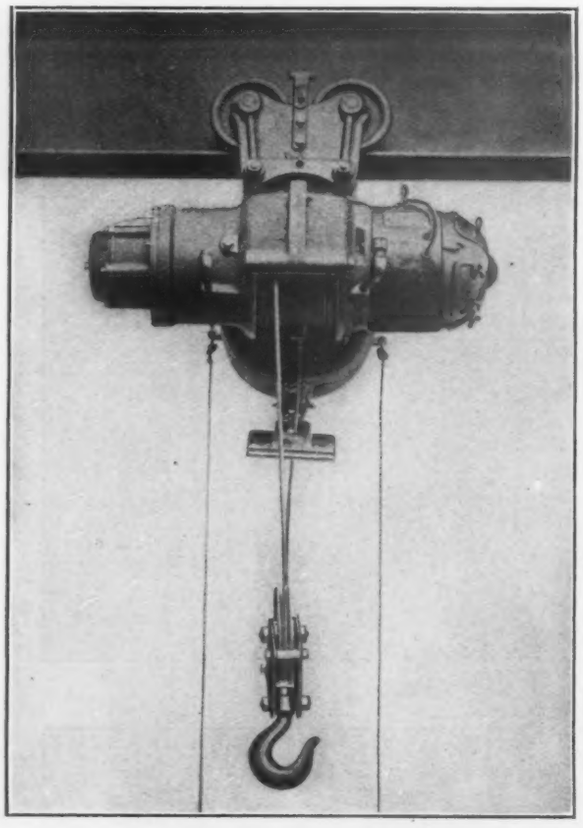


Fig. 1.—The Shepard Electric Hoist, Built by the General Pneumatic Tool Company, Montour Falls, N. Y.

dary importance to accessibility, and although the first has been obtained in a remarkable degree, it was at no sacrifice of the second characteristic. In fact, the result is a very creditable combination of the two features.

In practical use the parts most likely to require attention are the parts of the motor, and these in the Shepard hoists are very conveniently removed and replaced. To remove the armature, for instance, it is not necessary to disconnect any of the electric wiring except the armature leads, and the end shield of the motor is the only part of the frame that needs to be removed. During their removal or replacement all of the parts are easy of access. Each of the other important groups of parts is similarly accessible without disturbing any of the related parts. A common monkey wrench and a screw driver are the only tools required to take apart or reassemble the hoist.

Figs. 1 and 2, which compare the electric and pneumatic hoists, are indicative of the interchangeability of the two, and practically all of the running parts are identical in material and construction with the parts of the hoisting member of a Shepard electric crane.* This practice of assembling hoists from the same group of parts employed in cranes of equal capacity is distinctive, and is of advantage to the builder in reducing the cost to manufacture and to the user who needs to carry only one set of repair parts for different machines of the same capacity, and relatively few spare parts will suffice for a large and varied equipment. The hoists are unique also in the facility with which they can be applied to miscellanous hoisting purposes without material change of any part except to adapt the frames to the structures to which they are attached. Examples of this are shown in the two typical but different applications of the hoist illustrated in Figs. 3 and 4. The first is in operation at the new plant of the American La France Fire Engine Company, Elmira, N. Y., and is provided with a second motor for electric traveling and an operator's cage. The hoist shown in Fig. 4 also has electric travel, but is controlled from the floor. This hoist was installed for the Norton Company, Worcester, Mass.

None of the points so far mentioned are of so much importance as ample strength and reliability. No hoist, however ingenious, convenient, or commendable in other particulars, will be a success unless it is mechanically sound and sufficient for its work. Since the electric hoist is designed principally for light and medium loads, and is intended to be operated by unskilled workmen, it must be capable of withstanding without injury large overloads and inconsiderate handling. The compact design of the Shepard hoist is favorable to the making of all

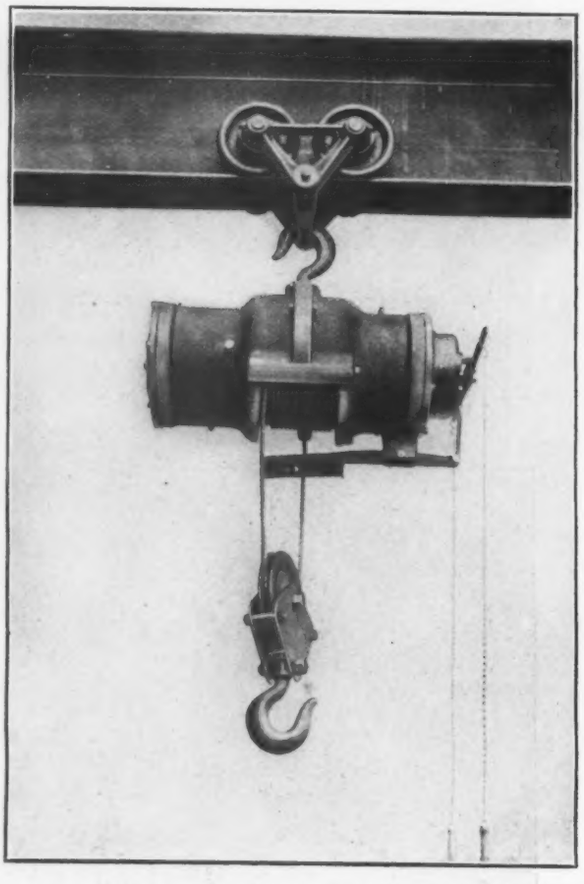


Fig. 2.—A Shepard Pneumatic Motor Hoist Showing the General Resemblance to the Electric Hoist.

parts of unusual strength. This and the making of all wearing parts larger than usually considered necessary, has been found possible without exceeding the dimensions and weight that are standard in a hoist of a given rated capacity.

For the same reasons that a hoist should be strong it should require as little attention as possible. By making all parts take permanently their proper position and leaving sufficient margin of safety so that natural and reasonable wear will not affect their perfect operation it was possible to do without the need of any adjustments. Lubrication can never be omitted in any machinery, no matter what its design or material, so that the best that can be done is to insure constant and thorough lubrication of all running parts with as infrequent necessity of renewing the oil supply as possible. In these hoists all parts are properly oiled by keeping three conspicuous oil reservoirs supplied, and their capacities are sufficient so that one filling will last for a considerable period.

Disagreeing with the common belief that in electric

* An illustrated description of the Shepard inclosed electric cranes appeared in *The Iron Age*, October 17, 1907.

hoists not intended for delicate handling of the load, speed control for gradual starting and stopping is superfluous, this company provides controllers with an exceptional number of resistance steps. Turning full voltage into series motors of small size shows no immediate damage, but ultimately the motor suffers, and certain it is that the unnecessary shock upon shafts, gears and hoisting rope, and unnecessary burning of the controller contacts by opening the circuit under full voltage and current strength, should be avoided. The number of resistance steps which have been used in the past on Shepard hoists have proved of such value in protecting the motor and controller that it has been decided to extend their number to 14 for hoists of the smallest size and to 18 for those of larger size. This will have the ever present advantage of affording delicate control of the hoisting and lowering speeds when needed. Experience has already indicated that much of the care formerly necessary to maintain the electrical features of the hoist in good condition will no longer be required, and the company believes that an important step will have been

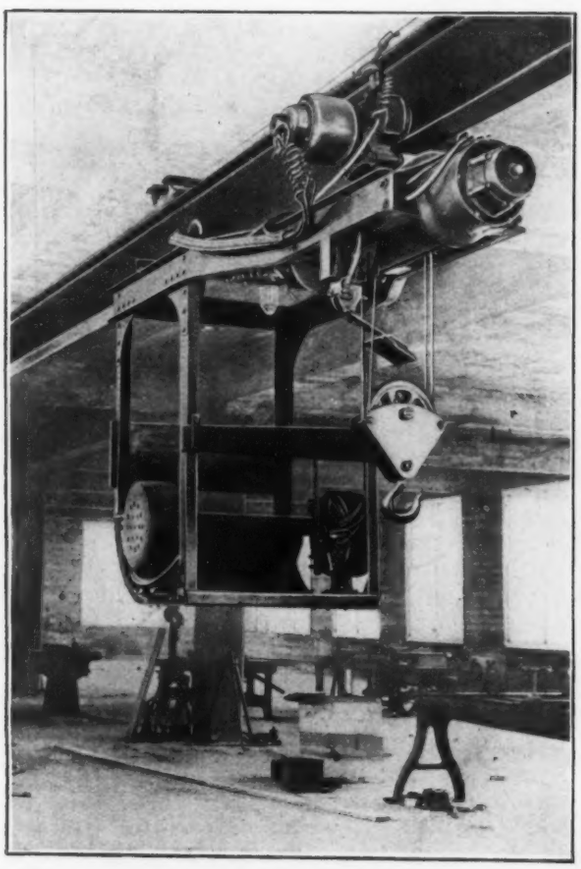


Fig. 3.—A Cage Controlled Two-Motor Shepard Traveling Electric Hoist.

taken in making the electric hoist an even more useful piece of equipment.

Guaranteeing Bank Deposits.

The New York *Evening Post* publishes the following correspondence from Kansas City, Mo.:

The bankers of the Middle West are talking of little else just now than the plan adopted by Oklahoma for guaranteeing bank deposits. The new law, which is to take effect February 15, is the first of this sort, and its operation is certain to be watched with great interest. The effect on the surrounding States is likewise of importance to the banks, and this furnishes a fruitful topic of discussion.

The Oklahoma law provides that every State bank shall pay to the State Banking Board 1 per cent. of its deposits to constitute a fund for the protection of the banks. When a bank fails, the bank commissioner is to step in and forthwith pay off the depositors, taking over the assets, the State becoming a preferred creditor. If the bank can pay out through the usual form of receivership the fund will be replenished; if not, the fund stands the loss. Should the fund not be large enough, it may be increased through assessment. It is expected that the national banks will be allowed by the comptroller to come under the same law through their voluntary contribution of 1 per cent. of daily deposits, a bill to that effect being introduced into Congress. Of course, should it not be allowed, the national banks would have to take out State

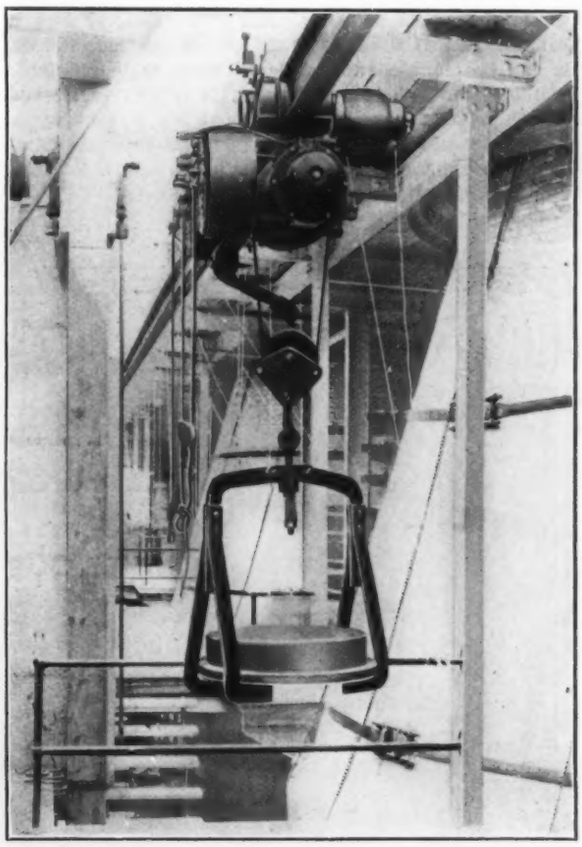


Fig. 4.—A Floor Controlled Two-Motor Shepard Traveling Electric Hoist.

charters, as they would not be able to retain their deposits.

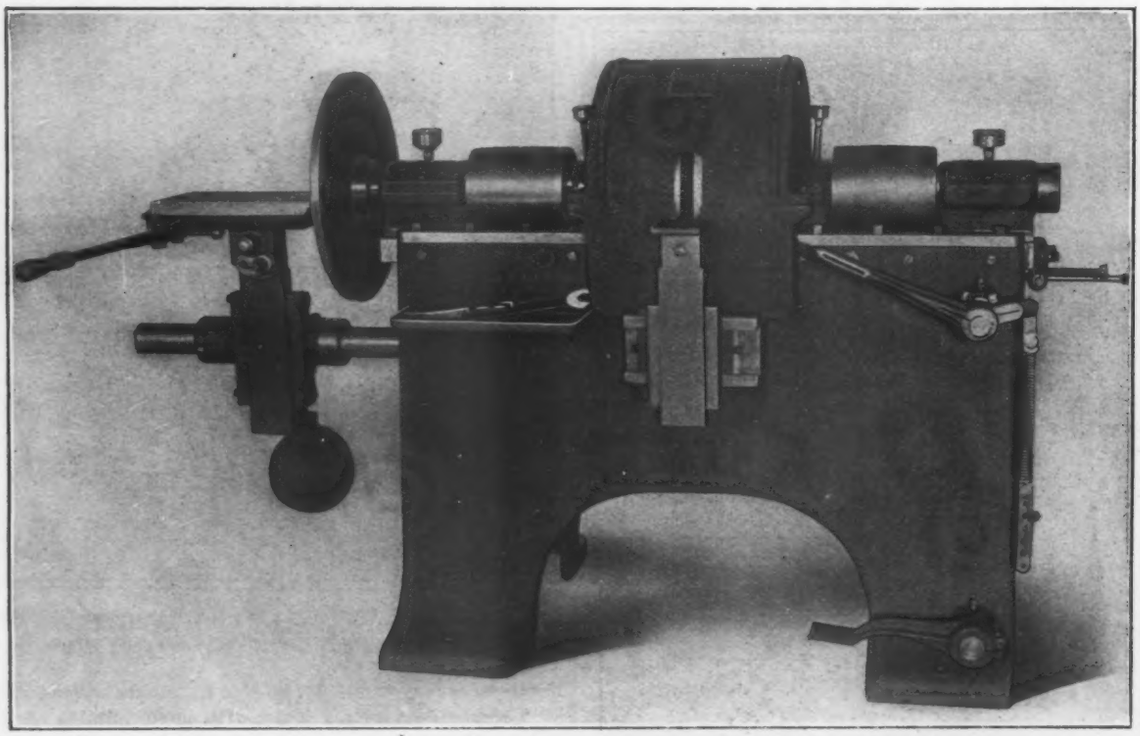
The plan has been received with commendation by the people, if not entirely so by the bankers. The people of Oklahoma have had a great deal of money deposited in the banks of Wichita and other southern Kansas towns, growing out of the unsettled condition of banking in the territory days. Many have given notice that they will withdraw their accounts when the new law takes effect, and this has caused much perturbation among the Kansas bankers. They are calling on the Governor to convene a special session of the Legislature to enact a similar law for the Kansas banks, of which there are over 900, with deposits of $150,000,000. The indications at this writing are that this will be done and that a similar law will take effect in Kansas at the same date as that of the Oklahoma law. Then it follows that the Kansas banks, which make this city a reserve center, will be tempted to withdraw their accounts and transfer them to the banks of their own State over the line in Kansas City, Kan., which are already making strong bids for the deposits. So it is possible that Missouri will have to take the same step, and the movement may spread throughout the West as a matter of protection of each State against the rivalry of its neighbor.

It is held by the advocates of the plan that it will bring back to the banks the millions that have been withdrawn, and that it will create a stability heretofore unknown among the bankers of the new States.

Due to a recent earthquake the only direct cable connecting America with the Orient was put out of commission between Midway Island and Guam.

The F. N. Gardner No. 14 Combination Disk Grinder.

The advantages of both a single head and a double head disk grinder are combined in the new No. 14 improved disk grinder, built by the Gardner Machine Company, Beliot, Wis. In its construction, as a double head machine, the right head is moved to and from the work by a hand lever or by a treadle, acting on a heavy steel rack, which is secured to the bottom of the right-hand head. The left head carries two wheels and has a free lateral adjustment of 8 in. A 2¾-in. diameter rocker shaft is extended from left hand end of the bed, and on this can be mounted any style of work table required. The table shown in the engraving is a universal lever feed table, and is especially adapted for a very large variety of manufacturing operations. The double head feature is practically adapted for machining from the rough pieces having equal opposite parallel faces, such as washers, nuts, bolt heads, &c. For double face grinding 20-in. diameter wheels are used. The open or left-hand end will swing disk wheels 23 in. in diameter.



The New No. 14 Combination Improved Disk Grinder Built by the Gardner Machine Company, Beloit, Wis.

As shown in the illustration this machine is of very rigid and powerful construction. The end thrust is taken on large hardened steel collars bearing on composite babbitt and cast iron. The double wheels are completely inclosed in a cast iron hood, which can be swung back allowing free access to the wheels. The hood is provided with an opening in the back of the machine bed for a connection to an exhaust fan. This hood is fitted with sheet shields, in which openings of any size can be made to accommodate the work in hand. When connected with an exhaust system the machine is claimed to be as clean and free from dust as an engine lathe or milling machine. A hood with exhaust connection can be furnished for the single wheel at the left end, but is not so shown. Both double machine and the lever feed table are provided with micrometer stop screws, which allow the production of duplicate and interchangeable work. The right movable head is also provided with an adjustable back stop to regulate the backward movement of the head when the retracting spring is used in connection with the foot lever. It will be noticed that this arrangement allows the operator free use of both hands for handling the work.

With this machine are furnished a floor setting-up press for cementing cloth circles to the face of steel disks, four 20-in. and two 23-in. by 13-16 in. steel disk wheels, a complete assortment of Gardner's improved cloth circles, special cold cement, grease and wrenches, or if preferred, three special chucks for ring emery wheels are furnished in place of the disk wheels. These special chucks are interchangeable with the disk wheels, and both chucks and disk wheels can be furnished with the machine.

This machine is perhaps the largest and heaviest disk grinder ever built. The spindles are very large and the machine is driven with 8-in. belts.

The Westinghouse Electric Industrial Cars.

In its own solution of the problem of economically transporting material from one part of the works to another the Westinghouse Machine Company has developed a line of storage battery autotrucks in capacities of from 10 to 40 tons. Before installing these trucks the company used small cast iron trucks of 3 ft. gauge, moved by hand, whose load was necessarily restricted to a few tons. Heavy castings were transported to within reach of overhead cranes by 50-ton trucks, which were usually moved by a rope passing under a snatch block and attached to a crane hook. Now with the storage battery autotrucks delays of material in transit, it is claimed, have been practically done away with, and since the trucks furnished their own power the labor has been greatly reduced. Another advantage was a marked improvement in crane service, since a crane was no longer needed for transporting castings below 10 tons in weight (the capacity of the first trucks installed) from one end of the long shops to the other, driving several cranes before it and putting them temporarily out of commission. When larger trucks were added there was a corresponding further improvement in crane service.

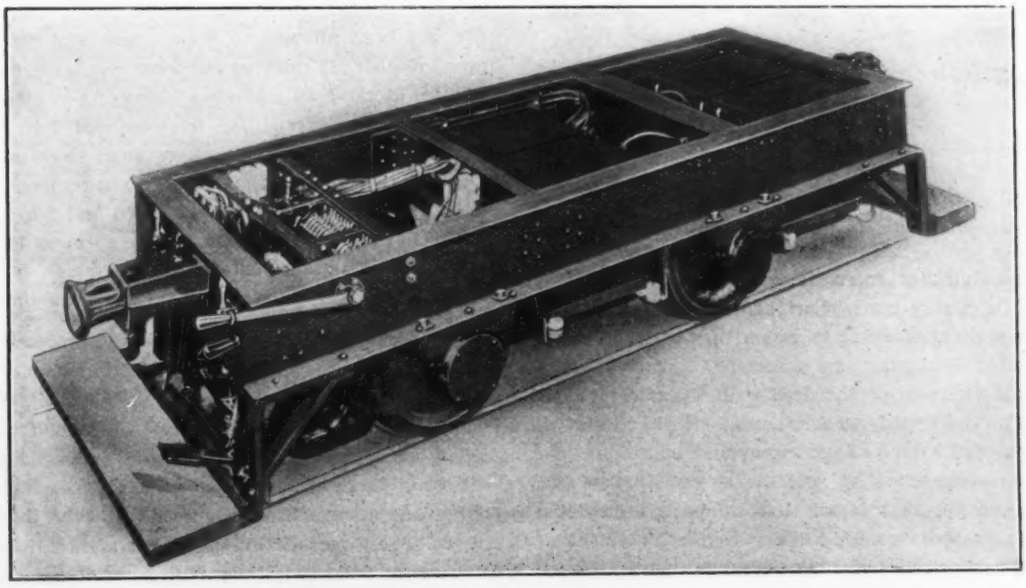
The trucks are of simple and substantial construction. A steel frame, thoroughly braced, is carried on four wheels, the journals of which run in roller bearings. The driving axle or axles, as the case may be, carry the motor, or motors, as in street railroad practice. The motor is spring suspended from the frame at one end, and connected to the driving axle by reducing gearing. A spring suspended cradle of angle iron carries the battery trays. At the operating end of the truck are mounted the controller, brake, charging receptacle, cut-out switch and

volt ammeter. A convenient step and drawbar head are provided at each end.

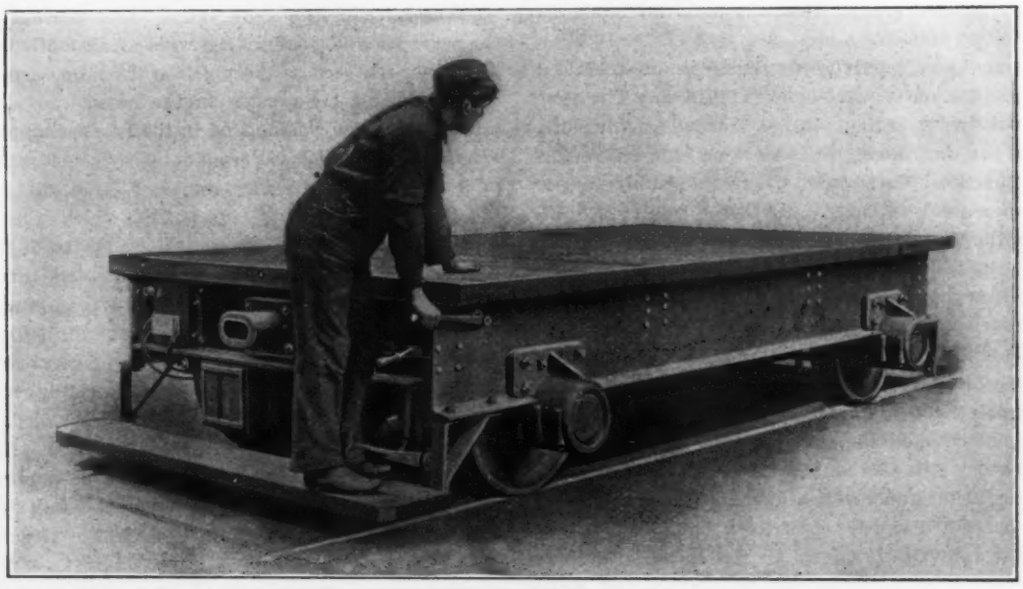
All the machinery is below the top of the frame and is covered by a heavy wooden deck for carrying the load. This deck is made in sections, so that any part of the mechanism is readily accessible. The motor is of the Westinghouse vehicle type, capable of standing heavy overloads, is dustproof and self-oiling. The controller is of the same type, and gives four speeds in either direction. It is provided with operating and reverse levers, which are interlocking to prevent premature reversal, thus protecting the motor and the batteries.

The battery is contained in two or more trays of cells, and is of ample capacity for the particular service. It is especially designed to operate at high rates of charge and discharge, and, therefore, a battery of four or five times the capacity, as is usually employed in similar service, is not needed, since the plates in this battery are capable of discharging at a very high rate for 3 or 4 min. at a time without injury. Another reason for adopting a battery of smaller ampere-hour capacity than customary is that the time available for charging during the working hours is usually thrice the period of time that the truck is actually running. Charging is made so simple that the truck can easily be charged during these idle periods. During a six months' test of the standard 10-ton. truck, herewith illustrated, the power required to charge the battery in regular and heavy shop service was accurately metered. It averaged 63 kw.-hr. per month. At the high figure of 5 cents per kilowatt-hour the cost for the current would be only $3.15. The work done was recorded and averaged practically 700 ton-miles per month, the loads running from a few hundred pounds to 15 tons.

These trucks used as locomotives on a level track and without any weight to secure adhesion can haul on suitable cars from one-half to their full rated capacity as a truck, depending upon the condition of the track and kind of bearings on the cars hauled. By placing sufficient weight over the drivers to secure adhesion they are capable of handling from one to two times their capacity as a truck for a continuous period of not more than 5 min. Standard trucks are made for six different gauges—18, 21½, 24, 30 and 36 in., and 4 ft. 8½ in. For track systems provided with turn tables they are made with rigid trucks. Where tracks are installed with curves the trucks for all gauges up to 36 in. are provided with swiveled front axle, permitting free operation on curves as low as 12 ft. in radius.



A 10-Ton Westinghouse Storage Battery Truck with the Deck Removed.



Operating End of a 40-Ton Flat Car Electrically Driven from Storage Batteries.

The Lorain Steel Company, Lorain, Ohio, has received from the Chicago City Railway Company a large contract for special equipment.

THE IRON AGE

Established in 1855.

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The Outlook.

The metal trades enter the year 1908 with greater hopes and in a very much chastened spirit. In some respects the scale of working to which they crowded themselves during November and December has created an exaggerated estimate of the decline in the country's requirements. The actual consumption of metal goods of all kinds, measured by the natural wear and tear, could not possibly be represented by so little as one-third of the capacity, and yet that is all that we have been doing lately in new bookings. We know that replacement of worn or weakened material can be made to wait for an astonishingly long period by patching or by temporary repairs, but even under such adverse influences tonnage must be very much greater than the artificial minimum of the past two months.

A resumption of activity is therefore unavoidable; it is only a question to what extent it will go. The stopping of works prior to the holidays had little significance. It went so far that during the past week, the active furnaces of the Steel Corporation represented only 20 per cent. of the total capacity. As little importance attaches to the restarting after the holidays, concerning which dispatches in the daily journals make so much. That our iron and metal industries will operate during the first quarter of 1908 at the rate of at least two-thirds capacity is the estimate of leading interests who possess exceptional facilities for gauging the situation. How much beyond that estimated minimum we shall go depends primarily upon the developments in the finances of the country. Business men have become cautious about cheerful utterances by bankers. The premium on currency has not disappeared in the schedule time fixed by financial authorities. Many an almost boastful word has been spoken, with the mental reservation that while it was good for the audience, it need not necessarily guide the speaker.

While there has been an almost continuous betterment in the financial situation, the consensus of opinion when frankly expressed is that we need time to get over the shocks to which the business world has been subjected. Our country has wonderful recuperative powers, but those are doomed to disappointment who expect us to jump back at one mighty bound to the plane of abounding prosperity from which we have been thrown. We cannot expect to run full during the first half of 1908, and, recognizing that fact, must make the best of the conditions forced upon the industries.

The best guarantee for the immediate future, however, for the iron and metal trades is the spirit which has become dominant in their councils. In former years the first sign of a decline in the demand was the signal for an indiscriminate onslaught upon the trade and territory of others, with its accompanying cutting of prices. Often such a course was dictated by the necessities due to inadequate working capital or credit. Selling by manufacturers or merchants made desperate by impending ruin has not been in evidence during this panic, the metal industries being sound beyond all precedent. The iron trade has before it the startling example of mismanagement in the copper industry, and is profiting by it. In fact, the critical period has passed safely, since stocks have not been allowed to accumulate, and prices were never inflated. It remains for those who are guiding the destinies of the iron and steel industries to meet buyers and encourage consumption by wise and fair readjustments of prices. New enterprises must show good prospects of larger returns than hitherto, in competition with the higher rates of returns which tried and proved undertakings now yield. That must come through lower cost of investment in new enterprises, to which both labor and the producer of materials must contribute their share.

The Problem of Iron and Steel Prices.

The question at what prices iron and steel products will again be freely bought after a period of suspended buying has always been discussed with the liveliest interest. These periods in which the market is dormant often result from conditions within the iron trade itself, as, for example, after a pool has conducted an apparently successful campaign at high prices, such as the wire nail trade well remembers. Less marked, but at the same time noticeable, intervals of abstention by buyers have been seen in the pig iron trade on several occasions. One of these came in the summer of 1905, another briefer one was noticed in the late spring and early summer of 1906 and was terminated by considerable sales of Southern No. 2 foundry iron at $13, Birmingham, the identical price, it may be noted, which the market touched last week on its return from the high levels reached in the boom of 1906 and 1907. Very often, after high prices have existed for months, consuming interests pause to take their bearings and to determine from the best light available whether general conditions are such as to warrant going on for a further stretch at substantially the prices that had prevailed. These tests, like the one in 1905, amount to a measuring of strength by producer and consumer to determine which side is really moving with the currents of trade and finance.

Much more of a problem is presented by such a paralyzing blow to business as has been dealt by the late panic. From a condition in which the machinery of production is strained almost to the breaking point, the iron trade within a few weeks passes to a condition in which capacity is apparently twice or three times the country's power to take up product. The possibilities of demoralization to the prices of iron and steel products in the months preceding recovery from panic and depression were well impressed upon every one connected with the trade in the years following 1893. With the exception of steel rails (and for a time rails were no exception) there was unrestricted competition in the products of iron mines, coke ovens, blast furnaces and rolling mills. The play of so-called natural laws of trade—if anything due to panic can be called natural—resulted in the low-

est prices the American iron trade has ever seen, accompanied by unparalleled distress to labor and the wiping out of millions of capital invested in iron and steel property.

It has been the common thing to say in the past eight or nine years, in which, except for a brief period in the midsummer of 1900, no form of finished steel has gone below 1¼ cents a pound, that the low prices of 1897 and 1898 would never come again, and the probabilities are that they will not. At 2-3 cent a pound for steel billets and 0.85 cent a pound for steel bars and steel beams the steel trade sunk to the lowest depths of distress. Since that day there has come a doubling and in some cases almost trebling of mineral values, and coal and iron ore, it is safe to say, are permanently well above the level to which they were crowded in the days of weak, scattered ownerships of iron and coal mines. It may not be far from the mark to say that, taking the average of raw material prices in the past 10 years, finished material on a 1.5 cent basis to-day is relatively cheaper than at 1.25 cents, before the very general pre-emption of the choice iron ores and coking coals of the country.

To what level the readjustment now in progress will bring iron and steel products in 1908 is a question of no small moment. The fact that leading manufacturers have conferred about the situation that each may have the best judgment of all as to the wise course to pursue, does not mean, as it has been interpreted in some quarters, that prices will not be changed. In 1904, when concerted action was taken on certain steel products through associations that no longer exist, steel billets were reduced to $23 and later to $19.50, Pittsburgh; steel bars to 1.30 cents; plates to 1.30 cents and 1.40 cents, according to width, and beams to 1.40 cents. In the case of plates and structural steel the reductions were from a long maintained basis of 1.60 cents, as compared with 1.70 cents in 1907.

The conditions to-day differ in a number of respects from those of the slowing down in 1904. The sharp shock of serious money panic was absent then. On the other hand, wages and commodity prices in general responded more quickly then to the liquidation in undigested securities and the cutting off of railroad and other large buying. Thus far in the present depression wage reductions have been few and the cost of living has been practically undiminished. If there is yet to come, as may be expected, a period of liquidation in industries, following the liquidation in securities and in banking, the problem of the right price for steel—the price at which consumption will be the largest possible under the conditions in the money market and in all steel consuming industries—will be more complicated. If history counts for anything it is folly to look upon the panic as an experience which the business world can quickly put behind it and call a closed incident. Credit has been sorely hurt and will need time to get back to soundness. The iron trade thus far has responded promptly to the conditions about it by reducing output to the shrunken ability of the country to absorb product. Its part in the general readjustment of values cannot be determined in advance, but as in other periods of uncertainty time will be required while patiently and somewhat painfully the industries of the country find their way back to good ground.

For large integrated companies, owning their raw materials and going into the market only for their labor, the way through a period of readjustment would naturally be shorter than for the merchant interests, whose costs are dependent largely upon the prices at which they can buy from others. The average producer of foundry iron, for example, must have lower ore and lower coke than he had last year before he can sell iron to meet the price recently made in sales by Southern furnaces. A mistake by ore producers in naming their prices would be a serious thing for him. Similarly iron rolling mills and the smaller producers of open hearth steel must know what the new basis for scrap is to be before they can commit htmselves to lower prices for their own products. And the large steel interests, even with complete control of raw materials, must consider the effect of their action upon the market at large in deciding at what prices they will sell their finished product. It is well that men of large experience in the iron trade are joined in the effort to meet the present crisis in a way that will make recovery as speedy as possible and with no false starts.

The Iron Trade Not Guilty.

In the effort to widen the responsibility for the financial revulsion the charge has been made that one of the contributing causes is extravagance. The American people have been taken to task in a wholesale way for extravagance—the individual as to his personal expenses, the family as to its methods of living, the commercial house as to its ambition to outshine its rivals, and the manufacturing company as to its sinking of more and more capital in means of increasing output. It is easy to make indiscriminate charges of this character, but in fact they have been made against Americans from time immemorial. Our people have invariably been held to be less frugal or more wasteful than the people of other countries. But conditions are here not the same as those prevailing in other lands. Opportunities are greater and returns from productive energy are more remunerative. Standards of living and of doing business are altogether different. It does not take a lifetime for an immigrant from some European country, with traditions of frugality and cheeseparing handed down from a long line of ancestors, to learn that he can safely indulge in personal comforts and household conveniences that in his own country would be hopelessly beyond his reach. He spends his earnings more freely, especially when he finds that even then he is able to accumulate. The huge sums in savings banks and the widespread ownership of homes by workingmen bear testimony to the truth of the assertion that pinching economy is not such a necessity in America that a liberal standard of individual or family expenditures can be styled national extravagance. Turning to agriculture, our farmers are not peasants, toiling from dawn to dark for a mere subsistence. Nowhere in the world are the rewards of agriculture more munificent or those who till the soil able to gratify their needs or desires more liberally. On such a substructure of generous living is our business fabric erected. Our merchants can usually take greater risks and our manufacturers can be more daring than would be the case if parsimony was the law of every American family and expenditures limited to necessities was part of the religion of every American citizen. Those who live beyond their incomes are the exception and not the rule in any American community. Their neighbors are far more apt to criticise than to imitate them.

The prosperity which this country has enjoyed for several years has not been merely superficial. It has been of the most substantial character. From the Atlantic to the Pacific and from the Great Lakes to the Gulf of Mexico our people have been most busily employed in winning fruitful returns from the soil, in developing our great mineral resources, in building huge irrigation systems for the reclamation of desert wastes,

in harnessing numberless water powers for generating electrical energy, in more thoroughly equipping cities, towns and villages with lighting plants and water works, in improving and extending urban and interurban transportation lines and in enormously enlarging the terminal facilities, trackage and equipment of our great railroads. Stupendous have been the achievements of the past four years in adding to the material wealth of the country and in making preparations for the future which will increase immeasurably the earnings of the productive forces of the nation. With this abounding activity in constructive development, the floating supply of labor has been far from adequate, and several European countries have found their apparently permanent surplus of labor exhausted because of the greater inducements offered here. The rapid increase in our population thus greatly stimulated building operations to house the new arrivals. All this meant a heavy concurrent consumption of manufactured products, and especially of all classes of iron and steel products. Commendable and not blameworthy has been the action of those enterprising men who have striven to meet the demand for such products which persistently increased every year. Despite their efforts, the demand even outran the supply for a time, as in the early months of 1907 it was necessary to import considerable quantities of pig iron as well as other merchandise. Unquestionably, if our manufacturing facilities had not expanded as they did, the prices of manufactured products would have risen beyond all reason, so insatiable was the demand. As it is, notwithstanding the fact that we look back to 1904-1907 as a "boom" period, there have been similar periods in the past when prices of iron and steel have risen much higher.

Those who charge the iron trade with contributing to the excessive draft on liquid capital, alleged to have been one of the causes of the financial breakdown, may have in mind such failures in the trade as those of Milliken Bros., the New York State Steel Company, the Southern Steel Company, the Westinghouse Electric & Mfg. Company and the Westinghouse Machine Company. If these failures had been the result of overproduction and had taken place at a time of declining demand, amidst merciless competition for orders attended by the recession of prices below cost of production, they could well have been cited as proof of the fact that manufacturing expansion had been pushed too far. But such was not the case. In every instance the failure was due to lack of working capital or faulty methods of financing. The error was made of not securing ample funds, while liquid capital was still available at reasonable rates. Each failure occurred with the works crowded with orders. But, it may be said, there is no doubt that we are now suffering from overproduction, as iron and steel works are idle by the score. There are many idle works, it is true, but not because manufacturing capacity has to that extent exceeded the consumptive requirements of the country. The derangement of business by the financial breakdown has restricted the consumption of iron and steel to a far greater extent than it was stimulated by the prosperity of the country in 1904-1907. Recovery is bound to take place as confidence revives, slowly at first and with greater rapidity afterward, until eventually every iron and steel plant properly located and judiciously managed will find a ready market for its product. The longer the period of recovery the stronger will be the demand, as the needs of this great country of ours steadily become heavier and heavier. When that time is at hand it will be seen that those manufacturers who, like the United States Steel Corporation, have projects under way for still greater expansion of their producing capacity, will find their increased output needed by hungry consumers. They deserve the praise and not the censure of a discriminating public.

Interstate Commerce Commission Decisions.

It is held that under the rate act no distinction is made between interstate railroads that are operated by electricity and those that use steam for motive power. It is further held that section 15 of the law limiting the power of the commission to establish through routes and joint rates to cases where "no reasonable or satisfactory through route exists" was not intended to afford a means by which new lines, with the aid of the commission, may profitably force their way into shipping districts built up and already well served by other lines.

Its attention being called to a tariff which in effect created a distributing point for a special industry by granting it free storage at that point, either in its own or the carriers' warehouses and practically without limit as to time, the merchandise when shipped out to go on balance of through rate, the commission expressed its disapproval.

A shipment consigned to one point was reconsigned en route to another, the tariffs then in effect containing no reconsignment privilege. As a consequence local rates to and from the reconsigning point were applied and made higher than the through rate. Held, under subsequent tariff that did not reduce rates, but incorporated a reconsignment privilege, that the benefit of such privilege could not be applied retroactively to a previous shipment and cannot be accepted as the basis for a refund on special reparation docket.

The commission has no power to relieve carriers from the obligations of tariffs providing for demurrage charges on the ground that such charges have been occasioned by a strike.

Claims filed with the commission since August 28, 1907, must have accrued within two years prior to the date when they are filed, otherwise they are barred by the statute. Claims filed on or before August 28, 1907, are not affected by the two years' limitation in the act.

The Weight Committee of the New England Foundrymen's Association, in accordance with resolution passed November 20, regarding a meeting of representatives of the different transportation, iron and coke producing companies with committees of the different foundrymen's associations, announces that it has been favored with replies from practically all the parties interested, and a meeting has been called to be held February 5, 1908, at 10 a.m., at the Bellevue-Stratford Hotel, Philadelphia.

According to the *Chemical Trade Journal*, there is considerable activity in Cumberland, England, in the production of wolfram and scheelite, and the Carrock mines have recently been sold to the Cumbrian Mining Company, Ltd. The ores were tried some years ago by Mushet, the inventor of self-hardening steel, who wrote adversely as to the contents in phosphoric acid, but more recent analyses tend to prove that the mineral is free from phosphorus and sulphur.

A party of electrical engineering students from the Iowa State College visited Milwaukee last week and inspected the plants of the Allis-Chalmers Company and the Cutler-Hammer Mfg. Company. From Milwaukee they went to Chicago to visit the South Chicago plant of the Illinois Steel Company. The party was in charge of Prof. F. A. Fish of the electrical engineering department.

The Engineers' Club of Philadelphia has purchased for a clubhouse a four-story building and lot, 25 x 170 ft., on Spruce street. After it has been remodeled the second floor will contain an assembly room for general meetings, and the first floor, dining, smoking and committee rooms. A billiard room and other social conveniences will also be provided.

THE PHILADELPHIA IRON TRADE IN 1907.

BY A. A. MILLER.

The past year began under the most favorable circumstances. Every branch of the trade was working under an enormous pressure, which continued practically during the entire first half of the year, but it was clearly evident that the tremendous pace at which business had been going during the last year or two could not be maintained, and when the recession came, which followed during the closing six months of the year, it was not unexpected and had been in many ways prepared for. The year 1906 was a prosperous one, and, as we all know, record tonnages were made in almost every branch of the trade, but had we not struck the down grade during the last half of 1907 it would be safe to say that 1906 would have been totally eclipsed by the records which would have been made during the past year. Even as it is, production in many lines will show up, even after the sharp curtailment, almost as well and in some instances even greater than in 1906.

Consumption in the first half of the year was exceedingly large, greater considerably in a number of instances than was the case in the same period in 1906. Makers of crude and finished materials were pressed to the utmost to meet the demand for deliveries, and in many cases prompt shipments were absolutely unobtainable. Manufacturing consumers were likewise pressed for deliveries in every line, and it was not unfrequent that plants had to be temporarily closed down owing to the inability to get deliveries of raw materials. The tonnages of iron and steel required were enormous, and every available method was employed to get out sufficient quantities to meet the demand. Mills were so fully booked ahead early in the year that, instead of contracting for materials for the customary periods of three or six months, they placed their requirements during the first few months of the year; in many instances for the entire year's supply. As the year wore on, however, evidences of the approaching decline became more and more apparent, but the trade was hardly prepared for the complete apathy which prevailed during the last quarter.

An Abrupt Change.

The recession, which began shortly after midyear, had been going on in a regular fashion, and the trade in a number of cases was welcoming the relief from the excessive strain which it had been under for so long, but the end was an abrupt one, and was due largely to unsettled financial conditions. The railroads were almost the first to feel the effect of the money disturbances, and their policy of withholding business for a time was the beginning of the decline. As financial troubles became more pronounced, curtailment on the part of the railroads became more extensive until a complete hold up of propositions under consideration was made, and operations were suspended on some classes of work under way. This was followed later by the announcement on the part of the railroads of their policies for 1908, under which new work of every kind was to be held in abeyance. This position taken by the railroads naturally had its effect on the large industrial concerns, who also determined on curtailment policies, and then gradually extended through the various branches of the trade.

The actual money stringency in this territory, which developed in the last quarter of the year, was probably not as pronounced as it was in some others. Failures were extremely few, and in no way affected the trade at large. Suspensions for short periods, due to the inability to get funds to keep plants going, were heard of occasionally, but were not serious. The banks were solid, and, outside of the inability to get currency, had no difficulty in doing business. In most cases funds were furnished to meet current payrolls, but except for the adoption of making payments for current accounts through the clearing house for a short time, no other relief was necessary in this city. Collections during the last four or five months of the year were naturally slow, and in most cases the larger concerns, which require extensive capital to keep plants going, were said to be the hardest to get payment from. It was impossible for a time to obtain loans on good securities, but creditors being situated in a like position were not pushing debtors very hard. Considering the gravity of the situation for a time this territory can be said to have weathered the financial storm in a very satisfactory manner.

From a practical standpoint, business was at a standstill during the last quarter of the year. In many cases contracts were canceled, and those who did not or could not cancel, curtailed deliveries to a very marked degree. Consumers almost without exception bought only such materials as were required to work up orders in hand, and all classes of available material, which had been accumulating in consumers' yards, was worked up rather than to go into the market under the existing financial conditions, and thereby incur increased indebtedness for raw materials.

Some Special Features.

One of the most remarkable features of the iron trade in the last half of 1907 was the absolute control that producers had of the situation, and the equanimity displayed in the adjusting of affairs to meet the changing conditions. Manufacturers of both crude and finished materials worked in perfect harmony, and while the decline in prices, particularly in crude materials, was very sharp, the recession was orderly and without the disastrous features so frequently found in a strongly declining market.

Buying during the year had been extremely varied. There was a strong purchasing movement early in the year, when the purchaser believed that if he did not get his tonnage for the year contracted for he would be unable to get materials later in the year, while during the last quarter the buyer was absolutely disinterested, no matter what the price might be. At times producers had orders in hand for their output for almost the entire year and were not seeking any further business. Buyers likewise had their requirements covered for a long period ahead, and current business was frequently at a standstill, simply because all the business that could be done had been taken care of.

Along about midyear several of the larger consumers of basic pig iron in this territory considered seriously the proposition of purchasing and operating furnaces themselves, so that their supply of pig iron might be assured. The Lukens Iron & Steel Company, Coatesville, Pa., one of the largest makers of basic open hearth steel and steel plates, with this in view, purchased the properties of the Allegheny Ore & Iron Company, operating furnaces at Buena Vista, Iron Gate and Shenandoah, Va., and owning and operating ore mines at Oriskany and Vesuvius, Va. Negotiations by other large consumers for furnace plants were also conducted, but purchases failed to be concluded.

Pig Iron Production Huge But Short of the Demand.

The country's production of pig iron the first half of the year showed a gain of almost 1,000,000 tons over that of the same period in 1906, and at the rate furnaces were going, and with the number of new furnaces that were going in, the production for the year promised to surpass greatly all former records. Yet even with the increase shown in production, consumption in the early part of the year was materially greater, and the scarcity in domestic iron was only relieved by the importation of foreign iron, which for a few months came in at the rate of about 50,000 tons a month.

Domestic production of pig iron increased more or less steadily through the first 10 months of the year, averaging nearly the 2,250,000-ton mark monthly. During the third quarter of the year, however, producers saw clearly that, with the reduced demand unless concerted action was taken to curtail production, the market would soon

become demoralized, and it was pretty generally believed that the reduction of output to a point somewhere near the level of consumption would be the proper method to follow. Many of the furnaces were badly in need of repairs and had been kept in blast long beyond the usual period, because of the contracts for high priced iron still on the books. In the last quarter, however, producers found these contracts getting pretty well cleaned up, and with the decline in prices, which fell below actual cost at some works, they began to blow out their furnaces, so that production for November underwent a marked decline, and the active weekly capacity on December 1 showed a falling off of 29 per cent. when compared with the same period in November. One of the most satisfactory features of the market to-day, however, is the fact that there is no accumulation of stocks of pig iron, either on the furnace banks or in consumers' yards, and when business does return to more normal conditions there will be no great tonnages of iron to be moved and the trade can go ahead on a bettter basis than has ever before been the case after a period of depression.

The Course of Pig Iron Prices.

Prices of pig iron varied greatly during the year. The market at many different times was difficult to quote. Prices on the same grade of iron from different makers frequently showed a variation of as much as $1 a ton. So many individual conditions had to be taken into consideration at times that quotations made were largely nominal. Early in the year, when consumers placed large tonnages covering deliveries almost throughout the year, prices were at a high level. The difficulty experienced by consumers in getting deliveries in the last half of 1906 encouraged this class of buying, and makers soon had their year's tonnage pretty well covered. Under these conditions, special quotations covering spot delivery and first, second and third quarter were usually named, and this practice continued during the first half of the year. No. 2 X foundry iron reached the high level of $27 for deliveries in the first quarter, which is higher than at any previous time during the past 30 years, except during a brief period in 1880.

In January the range for No. 2 X foundry was from $24 to $27, for delivery in the first half, while for the second half prices for the same grade ranged from $23 to $24.50. Spot deliveries commanded all kinds of premiums, varying according to the tonnage desired and who the customer might be, frequently running up to $2 and even in some cases $3 per ton. The high level for foundry irons was pretty well maintained throughout the first half of the year. Quotations in June for No. 2 X foundry averaged $24.75 for the third quarter delivery and $23.75 for the fourth quarter, while spot iron was still about $1 above the third quarter's figures.

With the coming of the stoppage in demand, however, there was a sharp falling off in prices. In October the question of delivery was fast being obliterated. Iron makers who were still working on high priced contracts in varying amounts were willing to make concessions to get tonnage to piece out their production in the remainder of the year, while those who had their make pretty well booked were holding firmly. For this reason prices of No. 2 X foundry showed a wide variation, and were based largely on how badly the maker needed iron.

In the closing month of the year producers were on a more equal basis. The curtailment policies adopted by consumers held up deliveries very extensively, and producers were willing to take business at materially lower figures, and the range of prices in December was between $18.50 and $19 for delivery in that month and January, 1908. In fact, some sales were made at prices which in individual cases were said to be considerably below cost, but could be advantageously handled, together with the higher priced orders still on hand.

The same wide range in prices noted in foundry iron was also to be found in the various other grades of pig iron. Steel making irons were bought in large blocks early in the year, covering in many cases almost the full requirements of consumers in 1907, and prices for delivery over the first half were held pretty closely around $25, delivered, practically all through that period. Beginning in June, however, a gradual weakening set in and prices receded from $23.50 for second half delivery to $17.50 for prompt delivery in December. The price of forge irons followed the same general course, the average being close to $23 during the first six months for deliveries in that period, and declining gradually during the second half to $16.75 in December. Low phosphorus irons were firm almost all through the year. The consumption and production of low phosphorus iron have been closer together than on any other grade, the supply having been limited. The heavy tonnages of this grade were sold early in the year, and late sales were almost entirely confined to small lots. Prices in January averaged $27.25, and the same figures ruled in October, after which, however, there was a recession to $25.25 in December. The following table shows the average price for the different grades for each month of the year based on deliveries in buyers' yards, Philadelphia and adjoining territory:

Prices of Pig Iron at Philadelphia in 1907.

	January.			February.		
	Spot.	First half.	Second half.	Spot.	First half.	Second half.
No. 2 X foundry	$28.50	$26.00	$23.75	$28.00	$26.00	$23.50
Standard gray forge	23.50	22.75	22.50	23.50	23.00	22.50
Basic	26.50	25.50	23.75	26.50	24.75	23.50
Low phosphorus	28.00	27.25	27.75	27.00	26.50	26.25
Middlesbrough No. 3	23.25	23.00	....	23.50	23.25	....

	March.			April.		
	Spot.	First half.	Second half.	Spot.	First half.	Second half.
No. 2 X foundry	$26.00	$25.00	$23.75	$25.75	$24.75	$23.75
Standard gray forge	23.50	23.00	22.50	23.00	22.75	22.00
Basic	25.50	24.50	23.25	25.00	24.25	23.25
Low phosphorus	27.50	27.25	26.75	27.50	27.25	26.75
Middlesbrough No. 3	22.00	21.75	....	21.75	21.50	....

	May.			June.		
	Spot.	First half.	Second half.	Spot.	Third qrtr.	Fourth qrtr.
No. 2 X foundry	$26.00	$24.75	$23.50	$25.75	$24.75	$23.75
Standard gray forge	23.25	22.75	22.25	23.00	22.60	22.25
Basic	25.50	25.00	23.50	24.25	24.00	23.25
Low phosphorus	27.75	27.50	27.75	27.50	27.75	27.75
Middlesbrough No. 3	22.75	22.50	....	22.60	22.25	....

	July.		August.		September.	
	Spot.	Second half.	Spot.	Last half.	Spot.	Last qrtr.
No. 2 X foundry	$23.00	$22.75	$23.00	$22.50	$21.75	$21.00
Standard gray forge	22.50	22.00	20.25	19.25	19.50	19.00
Basic	22.75	22.25	21.50	20.75	19.25	19.00
Low phosphorus	28.00	27.50	28.00	27.50	28.00	27.50

	October.		November.	December.
	Spot.	Last quarter.	Spot.	Spot.
No. 2 X foundry	$20.50	$21.00	$19.00	$18.75
Standard gray forge	18.75	18.25	17.00	16.75
Basic	19.00	18.50	17.75	17.50
Low phosphorus	27.50	27.25	26.00	25.25

Foreign Pig Iron.

While shipments of foreign iron began to come in pretty freely in the closing months of 1906, the greatest tonnage was imported in the early months of 1907, averaging for a time something like 50,000 tons monthly. Occasionally the large imports of iron, particularly of foundry grade, had a tendency to unsettle that market, but it was only to a slight extent, as deliveries of domestic irons were for the most part very unsatisfying.

The great bulk of the iron arriving at this port was Middlesbrough No. 3, which sold early in the year at $23 to $23.25 on dock. In March there was a little decline, owing to the heavy arrivals, and the price receded to $21.75 to $22 on dock. In May the demand strengthened a trifle and sales were made at $22.50 to $22.75 on dock for early delivery. In June and July, however, the prices for domestic iron began to fall off a bit, and the immediate supply appeared to be greater, so that the demand for foreign irons became weaker and the price sagged to from $22 to $22.50 on dock. As the domestic supply then began to improve and the consumption showed signs of declining, the demand for foreign iron dwindled and, outside of iron bought previously to arrive, the tonnage imported fell off until, except in the usual small lots, it had practically ceased.

In the early months of the year there was also a good tonnage of Scotch iron received at this port, the average price of which on dock was from $25 to $25.25. This grade also showed a falling off toward midsummer, when the price declined to $24.50 on dock.

Ferromanganese.

There was a wide range of prices in ferromanganese during 1907. Steel makers early in the year appeared to be afraid that they would not be able to get supplies to see them through the year, and the rush to get orders in raised prices very materially. In January 80 per cent. ferro was quoted at $79 to $80 for spot delivery, with $74 to $75 being named for delivery during the last half, while in May it had declined to $65 to $68 for early shipment, and to $63 for the last half delivery. But buyers as a rule had covered earlier and little business was to be placed. The demand during the remainder of the year was therefore dull, and as a rule was confined to small tonnages. Prices declined steadily until the end of the year, quotations in December being about $50, delivered in this territory, with almost no buying.

Steel Billets.

The steel mills in this territory began 1907 with heavy tonnages on their books, and for the first half of the year there was little let-up in the demand. Heavy orders were placed for forward delivery, and if at times new business was dull, specifications on old contracts came out freely, so that mills were fully occupied for the first nine months of the year. There was often an urgent demand for prompt delivery, for which premiums were paid. The demand, however, fell off decidedly during the last three months of the year. Consumers would not specify against old orders, and new business was extremely scarce, so that mills keeping in line with the general curtailment policy decreased production heavily, and at the close of the year were practically at a standstill.

Prices during the year did not show a very great variation. In the early months they ranged from $33 to $34 for ordinary rolling steel, declining toward midyear to about $31.50 to $32, and during the third quarter to $31 to $32. From $30 to $31 was the nominal quotation for billets the last quarter of the year, but had there been any reasonable demand this would undoubtedly have been shaded.

Plates.

Notwithstanding the fact that sales in the closing months of the year fell off very extensively, the production of steel plates in this territory probably made a gain of 5 to 10 per cent. over that of 1906. There was such a heavy pressure in the first nine or ten months of the year that mills were scarcely able to meet the demand. Deliveries at times were much delayed, and customers were willing, early in the year, to pay premiums for prompt shipment. The demand covered pretty fully all the various grades of plates, and there was but little change to be noted until late in the year, when in connection with the decline in other lines the demand for plates began to fall off. About November mills began to catch up on their orders, and with business decreasing, curtailments were adopted, reducing the output to about one-half, at which capacity most of the mills were running at the close of the year.

Prices of plates during 1907 did not show a great variation. They were highest at the beginning of the year, when 2.13½ to 2.18½ cents per pound was quoted for delivery in this territory. In April, tank, bridge and boat steel declined to 2.03½ to 2.08½ cents, and shortly afterward to 1.93½ to 1.98½ cents, with a corresponding decline in the other grades. These prices continued until the close of June, when the readjustment in freight rates, together with a weakening demand, made a readjustment of mill prices necessary, and the makers named 1.85 to 1.90 cents, which figures were maintained for the entire last half of the year. At a time, however, it looked very much as if there would be a further decline, but the concerted and harmonious action of makers steadied the market and made it possible to hold prices on an even basis.

Structural Material.

The structural steel mills in this territory have been uniformly active, almost throughout the year. Early in 1907 there was a comparatively large volume of orders on hand, but new business fell off as the year advanced, and although there was some fluctuation in immediate business, mills had enough to keep them fully occupied well toward the end of the year. When the financial depression came during the last quarter of the year, there was a recession in the demand for shapes, although orders continued to come in quite freely. The business, however, was confined to miscellaneous propositions, and nothing of any size developed until just at the close of the year, when several fair sized bridge contracts were placed. As a rule, mills were operated at their utmost capacity until about November, when some little curtailment was necessary, owing to the lack of orders. The output for the year, however, made a material gain on that of 1906.

Increased facilities were added to a number of mills during the year, while the new Saucon plant of the Bethlehem Steel Company will become a producer during the early months of 1908. This mill will make a specialty of the larger and heavier shapes for bridge and railroad work. Prices of structural material have been on an even basis throughout the entire year. The base price of 1.83½ to 2 cents has not varied, although premiums were paid at times for prompt deliveries which were frequently hard to get.

Bars.

The output of iron bars in the eastern Pennsylvania territory in 1907 was fully up to and in instances exceeded the tonnage for the previous year. The mills in the first half and part of the third quarter of the year had about as much business as they could take care of, and were in most instances booked well ahead. In the later portion of the year, however, orders were not so plentiful, and furthermore, owing to the general depression, bar iron makers were unable to get specifications on contracts taken earlier in the year, which had they materialized would have kept the mills uniformly busy. The production of bars was the heaviest during the month of March . There was a little decline in production in the second and third quarters, while a sharp falling off was to be noted in each succeeding month of the last quarter. In fact, the output for the month of November was just about half that of the month of March and December without doubt suffered a still further decline.

Prices for iron bars were at the highest early in the year. In January they were quoted at 1.83½ to 1.93½ cents, delivered, Philadelphia. There was a sagging in March, however, when 1.73½ to 1.83½ cents was the ruling price. After the month of June, when freight rates were rearranged, the price was 1.75 to 1.85 cents, which was maintained pretty firmly throughout the remainder of the year. For the first half of the year steel bars were in very short supply. Makers would take orders for forward delivery at the same prices as for iron bars, but until late in the year prompt deliveries almost always commanded a premium.

Old Material.

Speculative features have been so pronounced in the market for old materials that it was frequently almost impossible to tell just what the actual values of the various grades of scrap might be. It was not at all unusual to find dealers willing to pay $1 or $2 a ton more than the actual consumer would, as it was frequently necessary for them to get the material, no matter what the price, in order to complete a contract on specified time. Generally speaking, scrap was at the highest price in the second quarter of the year. Mills had been buying quite extensively for their future needs, and there was an apparent scarcity of old material at about that time.

No. 1 steel scrap, for melting, averaged about $18.50, delivered in buyers' yards, in the opening month of the year, but advanced steadily on heavy buying to about $19 to $19.25 in May and June for forward shipment, while spot was quoted at about $20. When it became apparent, about midyear, that the consumption would not be so great in the last half, prices weakened gradually, until in November the average price for this grade was about $13.25, delivered. In December the falling off was very heavy, and by the close of the year No. 1 steel scrap could have been bought in limited quantities at $11.50 to $12, delivered.

The other grades of scrap, as a rule, followed this same general course, there being exceptions from time to time as the demand for the particular grades became more or less urgent, as may be noted from the accompanying tables. It is to be observed that in the first half of the

year the gain in prices was comparatively uniform, while in the last half, or up to December 1, the decline was just as regular. In the closing month, however, prices on nearly every grade shrunk heavily and at the close of the year were at the lowest. With the exception of some of the specialties, prices were then fully one-third below those at the opening of the year, while in a few instances the decline has been practically 50 per cent. The range of prices, showing the highest, lowest and average prices during each month of the year, was as follows, per gross ton:

Prices of Old Material at Philadelphia in 1907.

	January.		February.		March.	
	High.	Low.	High.	Low.	High.	Low.
No. 1 steel scrap	$19.00	$18.00	$19.50	$18.50	$19.50	$18.75
Old iron rails	28.00	27.00	28.00	27.00	28.00	27.00
Old car wheels	23.50	23.00	24.00	22.50	25.00	23.25
Choice No. 1 railroad wrought	23.50	21.50	22.50	21.00	22.00	21.00
Machinery cast	22.25	21.25	22.50	22.00	22.75	22.25
Wrought turnings	16.50	16.00	17.00	16.00	17.25	16.50
Cast borings	14.50	13.25	15.50	14.40	16.50	15.00
Stove plate	17.00	16.50	17.25	16.50	18.50	16.75
Wrought iron pipe	16.50	16.00	16.50	16.00	17.50	16.50

	April.		May.		June.	
	High.	Low.	High.	Low.	High.	Low.
No. 1 steel scrap	$19.25	$18.75	$20.00	$18.75	$20.00	$18.25
Old iron rails	27.50	27.00	28.00	27.25	28.00	27.00
Old car wheels	25.00	24.00	26.00	24.00	26.00	25.00
Choice No. 1 railroad wrought	21.00	20.50	21.00	20.50	21.50	20.00
Machinery cast	21.50	21.00	21.50	20.50	21.50	20.00
Wrought turnings	17.25	16.25	17.50	16.75	17.50	16.75
Cast borings	16.00	15.50	16.25	16.00	16.50	16.00
Stove plate	17.75	17.25	18.25	17.50	18.25	17.75
Wrought iron pipe	17.50	16.75	17.50	17.00	17.50	16.75

	July.		August.		September.	
	High.	Low.	High.	Low.	High.	Low.
No. 1 steel scrap	$18.75	$17.50	$17.50	$16.50	$17.00	$16.50
Old iron rails	26.50	25.00	23.00	20.50	21.00	20.50
Old car wheels	25.00	25.00	25.00	23.00	23.50	23.00
Choice No. 1 railroad wrought	20.00	19.00	19.50	18.00	18.50	18.00
Machinery cast	20.50	19.00	19.50	18.00	18.50	18.00
Wrought turnings	17.00	15.00	15.50	14.00	14.50	14.00
Cast borings	15.50	14.00	14.50	13.00	13.50	12.50
Stove plate	17.50	16.00	16.00	14.50	15.00	14.50
Wrought iron pipe	16.75	15.50	15.75	14.75	15.00	14.50

	October.		November.		December.	
	High.	Low.	High.	Low.	High.	Low.
No. 1 steel scrap	$16.75	$15.00	$14.00	$12.00	$12.00	$11.50
Old iron rails	21.00	20.50	21.00	17.50	18.00	17.50
Old car wheels	23.50	22.75	21.00	19.00	20.00	19.00
Choice No. 1 railroad wrought	18.50	17.00	17.50	15.00	15.50	14.50
Machinery cast	18.50	17.00	17.50	16.00	16.00	15.50
Wrought turnings	14.00	12.25	12.50	10.50	9.50	9.00
Cast borings	12.75	10.50	9.00	8.00	7.50	7.00
Stove plate	15.00	14.50	15.00	13.00	13.00	12.50
Wrought iron pipe	15.00	14.00	14.00	13.50	13.00	12.50

The Outlook for 1908.

One of the most difficult problems presented to those who are usually pretty well posted on conditions is that of estimating on the probable course of the iron trade in the coming year. The governing conditions are so unusual that no comparisons with the past can be made. The financial situation is far from satisfactory, and, until that is adjusted and becomes more nearly normal, business will certainly be conducted on a conservative basis. Production and consumption must be brought nearer to a parity if prices are not to recede, and while the cooperation of producers and consumers and the policies of curtailment have had a beneficial effect in preventing utter demoralization, readjustments will have to be made in many directions if business is to again begin an upward trend.

From many standpoints the cost of materials, raw and finished, has been too high. Projects requiring large capital have been held up, owing to the apparent excessively high cost, and it will probably be necessary to start in again at a lower level in order to bring about the heavy consumption of the past few years. It is a slow and tedious process, however, to restore confidence after a period of depression, and with the usual handicap of a Presidential year ahead of us, it looks as if business would hardly be resumed as rapidly as it might be in other years.

The thought has been pretty generally expressed that there would be some improvement shown in buying shortly after the turn of the yeaar, principally because stocks in consumers' yards are so low; but it is more than likely that purchases for some time will be made on a conservative basis, to cover immediate needs, rather than to take care of possible future business.

The Theory of High Speed Tool Steel.

George Auchy of Philadelphia, furnishes the following additional contribution to his discussion of the above subject:

"In the article published in *The Iron Age* of December 26, on 'The Theory of High Speed Tool Steel,' the writer asked why Hadfield manganese steel does not serve for high speed tool steel. The answer to this question is probably to be found in a paper by Dr. Guillet in *Revue de Metallurgie*, 1905, pp. 350-367, abstracted in the *Journal* of the Iron and Steel Institute for 1905, volume 2. In this paper the fact is brought out that manganese gamma steel differs from nickel gamma steel in that it is exceedingly difficult to work. Here, then, is probably the practical difficulty that lies in the way of the use of such steel for high speed tools. But yet another question remains. It is probably the experience of every steel maker that all high speed steel is 'exceedingly difficult to work.' The question then is, Is gamma manganese steel more so than the present high speed steel? Probably it is, but it is obviously a point that steel makers want to be sure about. But if it is a fact that gamma manganese steel is exceptionally difficult to work compared with other high speed steels, then, of course, still less would martensitic manganese steels serve, not only for this same reason, but to a greater degree, also on account of the great brittleness of such steels."

The Krupp Annual Report.

The annual report of Fried. Krupp, a stock company of Essen, a. d. Ruhr, Germany, shows the financial results of the fourth year of the company into which the Krupp works were converted. The balance sheet for the year ending June 30, 1907, shows that the works and properties stood at 180,534,551.92 marks, there having been written off during the year 16,601,221.19 marks. Improvements and tools, railroad cars and ships are down at 9,379,232.32 marks and supplies and stock of finished goods and goods in course of manufacture at 115,499,123.84 marks. Patents and licenses are inventoried at 1,193,515 marks, and cash, drafts, &c., at 12,347,773.77 marks. The gross profit was 37,148,076.26 marks, from which are deducted taxes to the amount of 4,137,578.41 marks, workmen's insurance 3,391,041.57 marks, and for social service, &c., 4,775,190.18 marks, leaving net profits of 24,844,266.10 marks, or, adding the previous balance of 208,829.11 marks, a total available of 25,053,095.21 marks. The stockholders at their meeting decided to write off 5 per cent. under the law, amounting to 1,242,213 marks and a special amount of 4,500,000 marks. A dividend of 18,000,000 marks, or 10 per cent., was declared, and 1,000,000 marks was assigned as a special contribution to the workmen's fund. There are outstanding 16,915,000 marks out of 24,000,000 marks of the loan of 1893 and 18,885,300 marks of the loan of 1901.

A meeting of the Western Bar Iron Association will be held at the Fort Pitt Hotel, Pittsburgh, January 7. The purpose of this organization is to deal with labor questions, and the object of the approaching meeting is to consider the terms of an agreement with the Amalgamated Association relative to the operation of continuous mills, together with such other amendments to the scale as may be considered necessary. Any other business that may be presented touching the interest of the association will be considered.

The car ferry service of the Grand Trunk and Buffalo, Rochester & Pittsburgh lines, across Lake Ontario, between Coburg and Rochester, which was recently inaugurated, establishes another direct railroad connection between Canadian points and Pittsburgh.

THE SHEET AND TIN PLATE TRADES IN 1907.

BY B. E. V. LUTY, PITTSBURGH.

The year 1907 was, on the whole, one of the most prosperous the sheet and tin plate industries have enjoyed for several years; the first 10 months were certainly the most prosperous. There was a somewhat more satisfactory spread between raw material and finished prices in 1907 than in 1906, while there was a steadiness in demand and prices which contributed much to comfortable operations. Through the first three-quarters of the year production was maintained at record rate, but owing to the slump in demand late in the year the year's total tonnages will hardly show up as well as those of 1906.

Costs and Selling Prices.

Taking the Carnegie Steel Company's adjustment prices, per gross ton, on quarterly sheet bar contracts as a convenient and accurate index, for comparative purposes, to the cost of steel to both sheet and tin plate mills, the following averages can be struck:

	1906.	1907.		1906.	1907.
First quarter...	$26.00	$30.00	Fourth quarter..	$30.00	$31.00
Second quarter..	28.00	30.00			
Third quarter...	29.00	31.00	Year average..	$28.25	$30.50

This comparison indicates an average cost of sheet bars $2.25 higher in 1907 than in 1906, but the actual advance has, if anything, been less than this, as in 1907 outside mills furnished a greater proportion of the sheet bar supply than in 1906, and their sales for the second half were at $30, rather than at $31. Besides this, first half deliveries were much larger than second half, so that it is entirely fair to assume that the average cost of sheet bars in 1907 was no more than $2 a ton higher than in 1906.

The slight unevenness in sheet prices late in 1907 need not be considered in a comparison of realized prices on account of the extreme smallness of the tonnage involved. The recognized market prices of sheets and tin plates were unchanged throughout 1907, with the exception that galvanized sheets were advanced $2 a ton on January 24. In 1906 sheets were advanced $2 a ton on January 8, June 5 and October 25, the last advance establishing a price of 2.60 cents per pound on No. 28 black sheets, which has since been the recognized market. Average realized prices on the sheets shipped may be taken at about 2.45 cents for 1906 and 2.60 cents for 1907, showing an advance of $3 a ton. Tin plates were advanced four times in 1906, the year beginning with a $3.40 price, advancing by 10 cents on January 8 and April 9 and by 15 cents on May 18 and October 25, leaving a price of $3.90, which was maintained throughout 1907. For comparative purposes the average price of tin plate shipments in 1906 may be taken at $3.60, the price in 1907 being 30 cents a box, or $6 a ton, higher.

With an average selling price of sheets $3 a ton higher in 1907 than in 1906, compared with an advance of $2 a ton in sheet bars, there appears to have been a slight advantage to sheet mills in the spread. This was helped by the fact that sheet scrap brought measurably higher prices in 1907 than in 1906, but, on the other hand, other costs were higher, so that the net balance in favor of 1907 was very slight.

In tin plate the advantage of 1907 over 1906 was more marked than in sheets. The average realized price was $6 a ton higher, with slightly better prices for scrap, against an advance of $2 in sheet bars. In pig tin 1907 had a slight advantage, as the average price in that year was about 1½ cents per pound lower than in 1906, equal to about 6 cents per box of tin plate, or, on an average, about $1.25 per ton. The average daily closing price of spot tin in New York in 1906 was 39.82 cents, and in 1907 about 38.30 cents. The advantage was a statistical rather than a real one, since the lowest prices in 1907 were in the closing months, when the least tin was used. There is little question, however, that averages of daily prices are a correct index of pig tin costs. Except with almost unlimited means of consumption, the buyer of pig tin cannot hope to beat the daily average by much, while the most bungling buyer, apparently, cannot lose a great deal.

The reader may feel that the price comparisons we have just indulged in endeavor to make too fine distinctions and do not give the exact line on costs or profits which they appear to. Very true; they are not presented for that purpose. The desire is to show how finely the lines have been drawn in this industry in the prices of sheets and tin plates, relative to raw material and other costs. Prior to the establishment, only in very recent years, of this close alignment, there were the widest fluctuations in the spread between raw materials and finished product. The sheet mill not possessed of an independent steel supply was placed in a speculative position as to the buying of the one and the selling of the other, and with the exercise of the best judgment had still to be content with alternations of periods of high and low profits. The situation has been changed; perhaps, on the whole, profits are less than they used to be. The skill now is in attending to the details of the business in mill operations and in selling.

The Galvanizing Branch.

Some interesting comparisons could be made of the spread between black and galvanized sheets in different periods, and the average cost of spelter, but the statistical results might be misleading. There are other factors which enter into the case, but on the whole it is quite safe to say that the manufacture of galvanized sheets was relatively much more profitable in 1907 than in 1906. The demand for galvanized sheets, as against black, has been rapidly increasing, and mills have always been farther behind in shipments of galvanized than of black product, despite the constant increases in galvanizing capacity. As remarked in a review two years ago, the sheet industry is constantly tending toward galvanizing a larger and larger proportion of its output.

On November 15, 1904, the spread between black and galvanized sheets was increased from 1 to 1.05 cents per pound, the new prices being, on No. 28, 2.20 cents and 3.25 cents. Through various price changes this spread was maintained until on January 24, 1907, an independent advance of $2 a ton was made on galvanized sheets, increasing the spread to 1.15 cents, where it now stands. When the spread was increased from 1 to 1.05 cents on November 15, 1904, spelter at St. Louis was 5.35 cents per pound; when the spread was increased to 1.15 cents on January 24, 1907, spelter at St. Louis was 6.75 cents, and there were expectations of its soon reaching 7 cents. Within a month or two spelter began to decline, and later in the year it declined rapidly. In the middle of October, when *The Iron Age* reported some unevenness in black sheet prices, but very little in galvanized, spelter was at 5.35 cents, the same price which ruled when the spread between black and galvanized sheets was increased from 1 to 1.05 cents, while in December spelter declined to below 4½ cents; yet galvanized sheet prices were maintained better than black, with a nominal spread of 1.15 cents between them.

In all this there has been the influence of demand and competition, rather than of cost of raw material, and in this respect the galvanizing branch has been under a different alignment, as to costs and selling prices, than the sheet and tin plate industry in general.

Tonnage Production.

There are no accurate statistics of sheet production in the United States. Prior to 1905 the American Iron and Steel Association presented two totals, one including the production of all plates and sheets, including black plates, and the other covering black plates only. For 1905, at the request of manufacturers, the production of No. 12 and thicker was separated from the production of No. 13 and thinner. This distinction is useful to certain manufacturers for one reason only, which grows out of the arrangements which have come into vogue for the quoting of prices. It is not especially useful, for general

statistical purposes, without a further separation in the material No. 13 and lighter, into sheets which are box annealed and sheets which are not annealed, or are only annealed in an open fire. It is here submitted that this further distinction ought to be made. With the hearty co-operation of the manufacturers it could be introduced without difficulty. From 1894 to 1898, inclusive, sheet production was reported with a still finer subdivision as to gauges, and it is unfortunate that the practice had to be dropped.

In its annual reports the United States Steel Corporation gives the production of the American Sheet & Tin Plate Company, but does not separate sheets from tin plates. In our annual review one year ago it was estimated that the tonnage thus to be named in the forthcoming Steel Corporation report for the year 1906 would be about 1,100,000 gross tons. This estimate was made without the aid of any information from the company. The report which appeared later showed 1,112,542 gross tons, being only 1.1 per cent. different from our estimate. Also, without aid from the company, we now estimate that the tonnage to be reported for 1907 will be about 1,000,000 gross tons. This compares with previously reported tonnages as follows:

Production of the American Sheet & Tin Plate Company.

	Gross tons.		Gross tons.
1902	699,621	1905	924,439
1903	763,670	1906	1,112,542
1904	735,482	1907	*1,000,000

* Estimated.

Of black plate and tin and terne plate production in the United States the American Iron and Steel Association does return statistics. In our review a year ago we estimated that the production in 1906 was 560,000 gross tons of black plates and 540,000 gross tons of tin and terne plates. It was not until the month of December, 1907, that the American Iron and Steel Association was able to complete its statistics of black plate and tin plate production in 1906, then finding that the production of black plate amounted to 576,079 gross tons and the production of tin and terne plate to 577,562 gross tons, so that our estimates, almost a year earlier, had been but 3 and 6 per cent.. respectively, short of the officially presented figures. Such differences are almost negligible in statistics relating to these products, on account of different methods of reporting used by different producers. It can hardly be accepted that the figures are reported on the same principle from year to year when it is observed, for instance, that in 1898 18,339 tons more black plate than tin and ter e plate is reported; in 1901 1265 tons more tin plate than black plate is reported; in 1905 14,087 tons more black plate is reported, and in 1906 1483 tons more tin plate is reported. There is a quantity of black plate made each year for purposes other than tinning, and that tonnage is not subject to great changes; the black plate which is coated into tin plate and terne plate has a weight of tin and lead added, which weight does not vary materially from year to year.

We estimate the production in 1907 at 495,000 gross tons for black plates and the same for tin and terne plates. This compares with the previous official figures as follows:

United States Production of Black Plates and Tin and Terne Plates.

	Black plates. Gross tons.	Tin and terne plates. Gross tons.		Black plates. Gross tons.	Tin and terne plates. Gross tons.
1894	52,359	74,260	1901	398,026	399,291
1895	129,615	113,666	1902	365,743	360,000
1896	185,387	160,362	1903	490,652	480,000
1897	271,886	256,598	1904	472,569	458,000
1898	345,254	326,915	1905	507,587	493,500
1899	375,000	360,875	1906	576,079	577,562
1900	315,000	302,665	1907	*495,000	*495,000

* Estimated.

Thus production made a gain in 1906 over 1905, the best previous record, of 15 per cent., but in 1907 fell back to a production about equaling that in 1905. Even with this decrease, the production of tin plate in 1907 was substantially double that of 1897, 10 years earlier, and in 1897 the American industry supplied nearly all the domestic demand, the excess of imports in that year over tin plates required for drawback purposes being only about 25,000 tons.

The Course of Demand in 1907.

The sheet and tin plate mills opened the year with order books very well filled, and prospects of full operations for many months. Throughout the first half, new demand in both sheets and tin plates remained good. By June the situation was such that the leading interest's ordinary promises of delivery on new business in sheets ran from four to six months, such promises, of course, not being predicated entirely upon specifications actually in hand, but being based in part upon the rates at which regular customers were turning in specifications.

By the beginning of the second quarter of the year a number of large jobbers had become convinced that it would be desirable to have stocks as small as possible, in view of impending financial difficulties, but efforts to reduce stocks were repeatedly met by fresh demands for material which required them to specify anew. When, however, the decline in demand did come they were found with only moderate stocks. The demand for sheets from the small trade held out after the recession in general activity had become obvious, and the collections of jobbers also remained good for a period which surprised them, in view of what they knew was occurring in other lines.

The demand for canning plates was not altogether as good as in 1906, but was fairly satisfactory. The demand for tin plates for other than canning purposes was, on the whole, well sustained.

Toward the close of the year buyers of tin plate became thoroughly imbued with the idea that tin plate prices for 1908 deliveries would be on a substantially lower basis. This was argued from the decline in pig tin, the statement, generally credited at the beginning of December, that the Chinese had stocks of between 8000 and 9000 tons of pig tin—enough to supply the American tin plate industry for almost a year—and the prospect, as generally accepted, that steel would be lower for 1908. The fact that mills were ready, as usual, to make sales guaranteed against decline, and to hold the tin plate for some time before shipment, was not sufficient to induce buying, and in November the number of tin mills in operation dropped to the lowest point in years, barring temporary midsummer closings.

It has been the necessary practice of the tin plate trade to make up stocks toward the close of the year and early in January, to meet the rush in February and March, on account of the spring canning crops. In a normal year it is impossible for the mills to supply this February-March demand by their current production. Usually the orders are placed and the mills make up stocks, which are not their own, but their customers', held against shipping instructions. At this time the mills were confronted, through the apathy of buyers, with the alternatives of making their own stocks or closing, and they promptly chose the latter.

The tin mills usually reach January 1 with 1,500,000 boxes of tin plate in their warehouses. This year they have practically none. It appears probable that there will be a shortage of tin plate for the spring demand, and if inconvenience results it cannot be laid to the mills.

On account of this condition the production of tin plate was very light in the last quarter of 1907. This was in sharp contrast with 1906, when, contrary to precedent, the second half production actually exceeded that in the first half. The following table shows, approximately, the average number of tin mills in operation in each quarter in the past four years. These figures refer only to tin mills the product of which is actually coated, and are compiled from data set down from time to time. The averages cannot be absolutely correct, but are believed to be within 10 mills of the truth in all cases:

Average Number of Tin Mills in Operation.

	1904.	1905.	1906.	1907.
First quarter	265	295	270	285
Second quarter	270	300	260	290
Third quarter	175	150	265	225
Fourth quarter	215	170	285	125
Year	231	229	270	231

New Construction.

The independent tin plate industry underwent no material change in the year. There were only some minor changes in ownership of mills and no new construction of note.

The American Sheet & Tin Plate Company completed the addition of three mills to the New Kensington plants about the beginning of the year. On January 1 it closed the Star plant, Pittsburgh, containing eight tin mills, and in June the Falcon plant, at Niles, Ohio, containing six tin mills. Both these plants have been abandoned. The Star plant required some important changes to bring it up to the standard. On account of the excellence of its equipment the improvements would have been considered advisable, but there was not enough room, and besides it was not deemed advisable to prepare for the continued operation of a tin plate plant so near the heart of Pittsburgh. The company now has 242 tin mills in 18 plants.

Two important independent sheet plants have been completed in 1907—namely, those of the La Belle Iron Works, Steubenville, Ohio, and the Seneca Iron & Steel Company, Buffalo, N. Y. The La Belle plant comprises eight sheet and two jobbing mills, as an adjunct to the company's large and efficient steel mill. At the close of the year this sheet plant was practically completed, but in company with older mills was practically idle. During the year the company completed a 72-in. plate mill, on which light plates could be rolled. The Seneca Iron & Steel Company's plant comprises five sheet mills, with provision for three more, and a complete galvanizing plant. It has been completed for about three months, and has been operated to part capacity.

Early in the year the American Sheet & Tin Plate Company completed and started operating eight additional sheet mills at Vandergrift, Pa., making this a 37-mill plant. It has made important improvements at Vandergrift and elsewhere, but has not otherwise changed the number of its sheet mills.

The Number of Mills.

A year ago this report contained a table of "actually operative mills at the close of the year." The table of figures is repeated below, with the addition of data for 1907, but on account of doubts as to a few plants it will be designated merely as a list of mills in existence. Under tin plate the independent list contains a number of mills which are operated tin mill style, but the product of which is not actually tinned. This will largely explain the disparity between these totals and the figures of tin mills in operation by quarters, as previously given:

Number of Mills at the Close of the Year.

	Sheet.		Tin plate.	
	Corporation.	Independent.	Corporation.	Independent.
1907	179	148	242	110
1906	171	130	255	110
1905	171	130	248	109
1904	163	170	242	83
1903	164	155	264	71
1902	164	136	264	71

It is not pretended that these totals, except in the case of the leading interest, are absolutely correct to the last mill. The plants of the leading interest are as follows:

American Sheet & Tin Plate Company's Plants.

Tin.		Sheet.	Job-bing.	Light plate.
American	28	Vandergrift	37	.. ..
Anderson	7	Leechburg	11	.. ..
Cambridge	7	Hyde Park	6	.. ..
Chester	7	Saltsburg	4	.. ..
Crescent	6	Etna-Standard	16	5 1
Humbert	6	Canal Dover	11	.. ..
La Belle	10	New Philadelphia	9	1 ..
Laughlin	23	Canton	5	.. ..
Monongahela	8	Dresden	4	.. ..
Morewood	8	Guernsey	7	.. ..
National	25	Mercer	*5	.. ..
New Castle	20	Midland	7	.. ..
Pennsylvania	8	Piqua	4	.. ..
Pittsburgh	8	Old Meadow	8	.. ..
Sabraton	10	Scottdale	9	.. ..
Sharon	20	Struthers	6	.. ..
Shenango	30	Wellsville	10	.. ..
United States	11	Wood	12	.. 1
Eighteen plants	242	Eighteen plants	171	6 2

* Also Bray continuous mill.

The Tin Plate Wage Rebate.

The collection of the 3 per cent. from the wages of union tin mill workmen employed by the leading interest, to provide for the manufacture of rebate plates, was suspended February 1 and has not been resumed. There was a large sum in the fund at the time of the suspension, against which rebate tin plate had already been made, or was made soon thereafter.

This rebate system was inaugurated late in 1902, for the purpose of capturing a part of the tin plate trade which involves the making of containers for exported products, including petroleum and food products. The Government allows a rebate of 99 per cent. of the duty paid on tin plate made into such containers, on their exportation. The American Sheet & Tin Plate Company has a system whereby it pays a rebate on the exportation of containers made from its plates, and its arrangement with the union workmen is that they made such tin plate at 25 per cent. under the accepted scale. A deduction is made from their pay whereby to establish a fund, the deduction usually being 3 per cent., although this has been reduced to 1½ per cent. at times, and at other times has been totally suspended. From the fund thus created, which is in control of the Amalgamated Association, drafts are made as the company itself pays rebates to its customers, the drafts amounting to 25 per cent. of the wages originally paid for the making of the tin plates involved. The amount of rebate business thus done by the leading interest we should estimate roughly to have averaged between 300,000 and 400,000 boxes a year.

The Pittsburgh Emery Wheel Company.—At a meeting held in the offices of the company, Park Building, Pittsburgh, on December 14, a report of operations submitted by the president showed that remarkable progress had been made in the building of the plant at Rochester, Pa. A permanent organization of the company had been effected and plans outlined October 7. On November 2 a site of 5 acres of ground was purchased and excavating work begun the same day. The report above mentioned showed that a two-story building, 70 x 100 ft., to be used for mixing, drying and turning, is under roof and will be prepared for operation early in January, at which time work will also be completed on the four initial kilns the company is building, and the kilns fired up with an approximate output of 5000 wheels per month. By February 1 the company will be ready to ship adamite, corundum, borundum and emery wheels. A siding of 650 ft. is being laid to connect the plant with the main line of the Pennsylvania Railroad at Rochester. C. G. Smith is president; David B. Hyde, vice-president; Albert W. Smith, treasurer, and Jacob W. Hetzel, secretary. All of the officers of the company are experienced in the manufacture and practical uses of grinding machinery and accessories.

The Tri-State Mining Association, composed of representatives of the zinc mining interests of Wisconsin, Illinois and Iowa, will hold its next meeting at Galena, Ill., January 17. The association is doing much to advance the mining and metallurgical development of the lead and zinc regions of the three States. Prof. U. S. Grant, dean of the Northwestern University, who was responsible for the geological mapping of the tri-State field, will attend the meeting and deliver an address. The Governors of the three States have been given special invitations to attend.

The first electric car running under its own power was successfully sent through the north tube of the McAdoo tunnel under the Hudson River between Hoboken, N. J., and Christopher street, New York City, December 28. It carried Walter G. Oakman, president of the Hudson Companies; W. G. McAdoo, president of the tunnel company; Charles M. Jacobs, chief engineer; J. V. Davies, his deputy; Wilbur Fisk of J. Harvey Fisk & Sons; L. B. Stillwell, consulting electrical engineer, and Hugh Hazelton, electrical engineer. E. M. Hedley, general superintendent of the company, acted as motorman.

NEWS OF THE WORKS.

Iron and Steel.

The Wright Wire Company, Worcester, Mass., has resumed full production in its wire mills at Palmer and in its weaving department, comprising about two-thirds of the total capacity of the works. The remainder of the two plants are running on 50 hours a week. The company has laid off few men, with the exception of certain construction gangs engaged in the erection of new buildings. A considerable amount of new business has been booked.

General Machinery.

The Niles Tool Works of the Niles-Bement-Pond Company, at Hamilton, Ohio, which was closed down December 21 for two weeks for inventory and repairs, will be reopened January 6.

The Refractory Ore Extraction Company has been organized at Ft. Wayne, Ind., and incorporated with $100,000 capital stock, to manufacture machinery for extracting metals from ores. The directors are J. H. Bass, Wm. Geake and L. A. Centlivre.

It is stated that the Lake Shore & Michigan Southern Railroad has purchased 25 acres of land at Elkhart, Ind., to be used as a site for new shops.

Foundries.

Tate, Jones & Co., Inc., Pittsburgh, have received a contract for a complete installation of their combination oil and gas furnace equipment in the core ovens of the Westinghouse Air Brake Company at Wilmerding, Pa. Some time ago the company installed one of these furnaces in this foundry, and it gave such good results that the Westinghouse Air Brake Company decided to install additional furnaces.

Charles D. Thompson of Jersey City has been appointed receiver for the Reliance Steel Company, which operated the old plant of the Wiegand-Cooke Company at Delawanna, N. J.

Power Plant Equipment.

Recent installations of the B. F. Sturtevant Company, Hyde Park, Mass., through its electrical department, include: Board of Water Supply, Babylon, N. Y., one 9 x 8 in. vertical center crank engine, direct connected to one of its standard slow speed 25-kw. generators; Hanover National Bank, New York, one 12 x 10 in. engine, 50-kw. generator; Eberhard Faber Pencil Company, Brooklyn, N. Y., one 16 x 14 in. horizontal automatic center crank engine, direct connected to one 100-kw. generator; Bouker Contracting Company, New York, one 4½ x 4½ in. engine, direct connected to 5-kw. generator; Central Union Gas Company, New York, one 5 x 7 in. engine, direct connected to 15-kw. generator; Vulcan Detinning Company, Sewaren, N. J., one 7 x 7 in. vertical engine; Hotel Takanassee, Long Branch, N. J., one 16 x 14 in. horizontal engine, direct connected to 75-kw. generator, and one 13 x 12 in. horizontal engine, direct connected to 50-kw. generator; H. J. McCoy, New York, one 11 x 9 in. vertical engine; Washburn Brothers, Saugerties, N. Y., one 25-hp. motor; New York State Reformatory for Women, Bedford, N. Y., one 13 x 12 in. horizontal engine, direct connected to 50-kw. generator; Isidor Fajans, New York, one 6 x 6 in. engine, direct connected to 10-kw. generator; Johnson & Johnson, steamer Robert Johnson, one 6 x 6 in. vertical engine, direct connected to 7½-kw. generator; Andrew McLean Company, Passaic, N. J., one 6 x 6 in. vertical engine; Royal Mfg. Company, Rahway, N. J., one 8 x 6 in. vertical engine, direct connected to 6-kw. generator; New York Engineering Company, New York, three 4½ x 4½ in. vertical engines, direct connected to 5-kw. generators; Parker Engineering Company, New York, one 14 x 14 in. engine, direct connected to 75-kw. generator; Henry Steers, Inc., New York, three 7½-kw. generators; Samuel Smith & Sons, Paterson, N. J., one 14 x 14 in. engine, direct connected to two 50-kw. generators.

Citizens of Knightstown, Ind., have voted in favor of reconstructing the municipal electric light plant, at a cost of $12,000.

Fires.

The plant of the Carborundum Company, Niagara Falls, N. Y., was damaged $20,000 by fire December 23.

The plant of the Holbrook, Armstrong Iron Company, Racine Junction, Wis., was damaged $5000 by fire December 24.

Bridges and Buildings.

The Pittsburgh Construction Company, Diamond Bank Building, Pittsburgh, Pa., has received a contract to reinforce the steel work and renew the deck of the Thirty-third street viaduct of the Baltimore & Ohio Railroad at Pittsburgh.

Hardware.

The factory of the Knox Metal Wheel Company, Knox, Ind., was recently destroyed by fire. The plant had not been entirely completed, but would have been ready for operation within a few days. Work is in progress on a new building, which will be ready for occupancy early in January.

The Meeks Mfg. Company has been organized at South Bend, Ind., and incorporated with $10,000 capital stock. The company will manufacture an automatically propelled swimming device patented by U. S. Meeks, for teaching people to swim.

Fluctuations in Pig Iron Production.

The record of pig iron production in the United States in the past four years begins and ends with output at a low level. A curve plotted from the figures representing production month by month in that period would begin with a sharp ascent, after the drastic curtailment in the closing months of 1903, and end with a plunge to a depth not yet determined. We have prepared such a diagram in the accompanying chart, based on the figures for the production of coke and anthracite pig iron given month by month in the blast furnace statistics of *The Iron Age*. The year 1903 has been included also, so that comparison may be made between the curtailment movement of 1903 and that of 1907. A more striking exhibit could be made of the sharp cutting off of production in the past two months were it possible to show the output of the coke and anthracite furnaces in December, 1907. All indications at this writing are that the December figures will carry the curve into the space for that month at almost, if not quite, the same sharp angle of descent made by the line for November. The figures on which the diagram is based are the following:

Table of Coke and Anthracite Pig Iron Production by Months in 1903-1907.—Gross Tons.

	1903.	1904.	1905.	1906.	1907.
January	1,472,788	921,231	1,781,847	2,068,893	2,205,607
February	1,390,615	1,205,449	1,597,343	1,904,032	2,045,068
March	1,590,470	1,447,065	1,936,264	2,165,632	2,226,457
April	1,614,121	1,555,267	1,922,041	2,073,645	2,216,558
May	1,599,703	1,533,350	1,963,717	2,098,746	2,295,505
June	1,673,228	1,292,030	1,793,289	1,976,733	2,234,575
July	1,546,184	1,106,207	1,741,935	2,013,402	2,255,660
August	1,571,126	1,167,672	1,843,673	1,926,736	2,250,410
September	1,553,717	1,352,677	1,899,500	1,970,962	2,183,487
October	1,425,282	1,450,401	2,053,174	2,196,808	2,336,972
November	1,039,622	1,486,605	2,014,021	2,187,665	1,828,125
December	846,695	1,616,007	2,045,718	2,235,306	.....

It should be said that the plotted lines do not give an exact representation of the changing rate of coke and anthracite production in the past 60 months. The varying lengths of the months result in sharper angles than would result if the spaces from left to right were one-twelfth parts of a year, instead of 30-day and 31-day, and, in the case of February, 28-day periods. The dip for February, coming between the 31-day months January and March, is noticeable in every year, with the exception of 1904, when, irrespective of the short month, production increased in February because the curtailment in the last two months of 1903 had been too drastic. Another feature of the curve is the more or less pronounced dip in the summer season—not so noticeable in 1907, because every nerve was being strained in the first three quarters of the year to increase pig iron output, and only when linings had been worn to the last degree were stacks put out of commission. Partly due to heat and humidity and partly to the annual pause for assurance as to crop outcome, the blast furnace industry seems to have taken on a habit of midsummer slackening. The abruptness of the descent in the early summer of 1904 tells graphically the story of the false start made in the spring of that year, when the United States Steel Corporation took options on a large tonnage of Bessemer pig iron, only a portion of which was afterward actually purchased.

It will be seen that the swing in the period beginning with December, 1903, and ending with October, 1907, both months of 31 days, is from 846,695 tons to 2,336,972 tons, or in the one case a yearly rate of 10,000,000 tons of coke and anthracite iron and in the other a yearly rate of 27,500,000 tons—a remarkable variation for a period of but 46 months. It indicates that in spite of the common belief that the iron trade of the United States has become more regular in its habits there is still much to be gained in that direction.

Perhaps the most impressive feature of the chart is the spectacular way in which the pig iron trade took leave of prosperity. The record peak in October stands out as a monument to the most remarkable stretch of sustained high level production in our history. It prompts the question, on which present conditions throw little light, When shall its like be seen again?

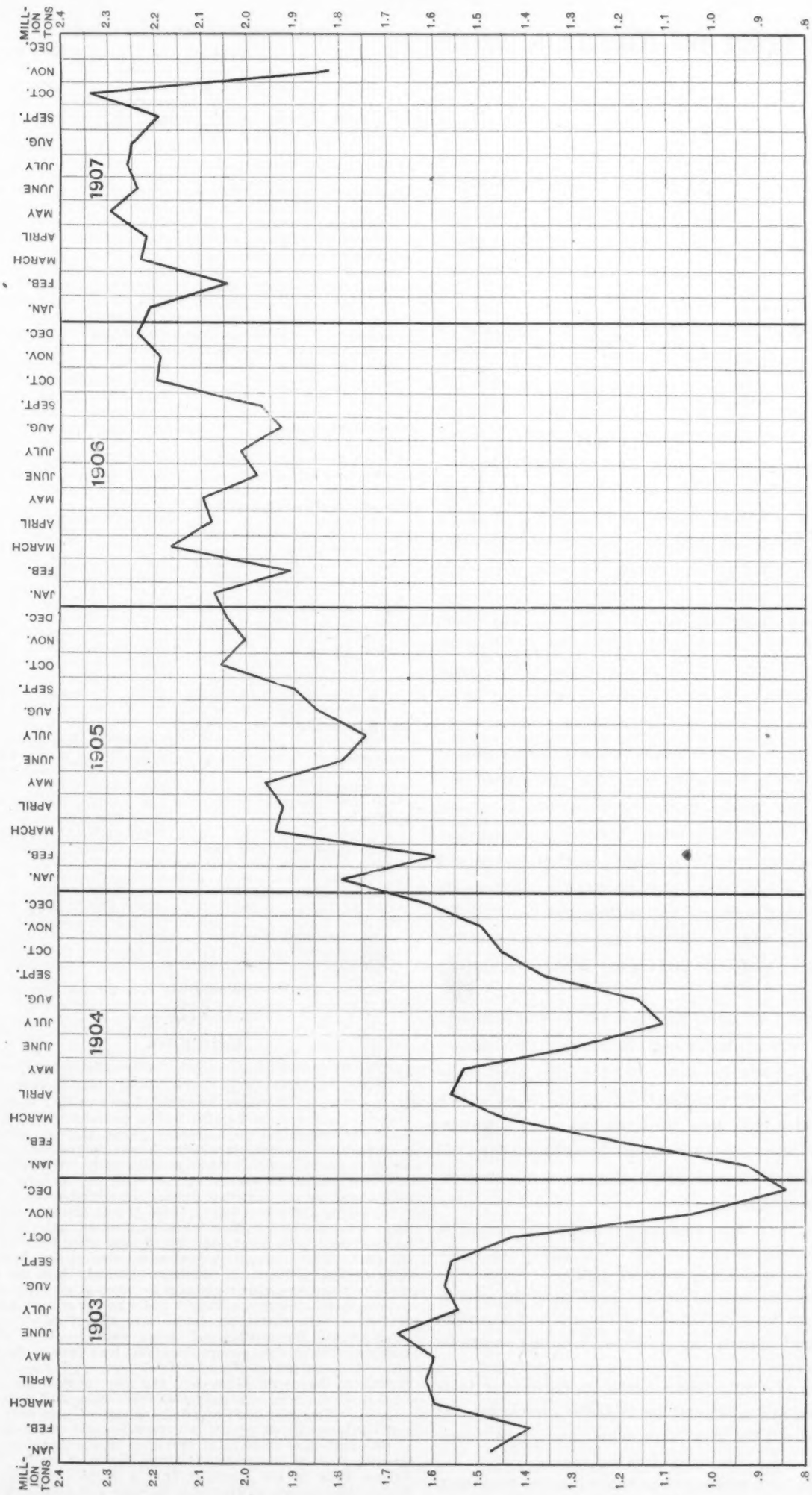

Chart Showing the Fluctuations in Coke and Anthracite Pig Iron Production in the United States in the Years 1903 to 1907 Inclusive.

The Iron and Metal Trades

The report has been given considerable currency that there would become effective on January 1 a lower range of prices on Structural Material, Plates, Tubes, Sheets and Tin Plate. The plans of the makers, as developed thus far, do not justify the expectation of an immediate readjustment of prices, although some change in Sheets and Tin Plate may be made toward the middle of the coming month.

Pittsburgh seems to have become the headquarters of a group of publicity managers, who are attempting to force "restoration of confidence" by sending out elaborate accounts of a widespread resumption of industrial activity. Unfortunately many of these reports are either untrue or misleading. The number of plants active during the holidays was very small, and naturally a considerable percentage of the idle ones will start up, in some cases because they have accumulated orders, but such resumption will not restore the industry there or elsewhere to anything like its normal rate of productiveness. Any exaggerated statements as to the near future now will only create the greater disappointment later on, when the truth is realized. The work now in sight justifies operations to the extent of close to 50 per cent. of the capacity.

The Pig Iron Committee is in session at the present writing, all the leading interests being represented. During the past week inquiries have improved in all the principal distributing markets, but very little new tonnage has been booked, and in some quarters a weakening tendency has developed. Other makers, however, are holding aloof and are not meeting the lowest prices named, this being notably the case with some Southern producers who decline to go below $13.50, Birmingham, for No. 2.

No new Rail orders have been placed, and outside of two or three moderate lots, one of them for Cuba, no tangible business is in sight at the present moment. Some business in Structural Material has been placed in Chicago, and several good sized lots are in sight in New York. Moderate orders have been booked for Plates, and it is expected that some shipbuilding work will come out on the Delaware.

In the Cast Iron Pipe trade we note the placing of one 4000-ton contract in New York, and there is the prospect of some heavy work for Boston.

There have been no new developments in the markets for Old Material throughout the country, which remains in a very unsatisfactory condition from the standpoint of the sellers.

There is a little better feeling in the Copper trade and Electrolytic has sold up to 13.50c. Lead, too, has hardened to 3.75c., New York, with quite a good volume of business done during the past few days.

LATER.—Tin Plates will be reduced 20c. or from $3.90 to $3.70, per base box, Pittsburgh, effective January 6.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Jan. 1, 1908.	Dec. 24, 1907.	Dec. 4, 1907.	Jan. 2, 1907.
PIG IRON, Per Gross Ton:				
Foundry No. 2, Standard, Philadelphia	*$18.00*	$18.25	$18.75	$25.75
Foundry No. 2, Southern, Cincinnati	*16.25*	16.25	18.00	26.00
Foundry No. 2, Local, Chicago	*18.50*	18.00	19.00	25.50
Bessemer, Pittsburgh	*19.40*	19.40*	19.90	23.35
Gray Forge, Pittsburgh	*17.65*	17.90	18.90	22.85
Lake Superior Charcoal, Chicago	*23.50*	23.50	25.00	26.00
BILLETS, &c., Per Gross Ton:				
Bessemer Billets, Pittsburgh	28.00	28.00	28.00	29.50
Forging Billets, Pittsburgh	30.00	30.00	30.00	36.50
Open Hearth Billets, Phila	30.00	30.00	30.00	34.00
Wire Rods, Pittsburgh	34.00	34.00	34.00	37.00
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00
OLD MATERIAL, Per Gross Ton:				
Steel Rails, Melting, Chicago	*12.00*	12.00	13.75	18.00
Steel Rails, Melting, Phila	11.50	11.50	11.50	20.00
Iron Rails, Chicago	*15.00*	15.00	15.50	28.00
Iron Rails, Philadelphia	17.50	17.50	17.50	27.75
Car Wheels, Chicago	*20.00*	20.00	22.00	25.00
Car Wheels, Philadelphia	19.00	19.00	19.00	23.00
Heavy Steel Scrap, Pittsburgh	*12.50*	12.50	13.50	20.00
Heavy Steel Scrap, Chicago	*10.75*	10.75	12.00	17.00
Heavy Steel Scrap, Phila	11.50	11.50	11.50	17.00
FINISHED IRON AND STEEL, Per Pound:	Cents.	Cents.	Cents.	Cents.
Refined Iron Bars, Philadelphia	1.75	1.75	1.75	1.88½
Common Iron Bars, Chicago	1.75	1.75	1.75	1.81½
Common Iron Bars, Pittsburgh	1.60	1.60	1.60	1.80
Steel Bars, Tidewater, New York	1.76	1.76	1.76	1.74½
Steel Bars, Pittsburgh	1.60	1.60	1.60	1.60
Tank Plates, Tidewater, New York	1.86	1.86	1.86	1.84½
Tank Plates, Pittsburgh	1.70	1.70	1.70	1.70
Beams, Tidewater, New York	1.86	1.86	1.86	1.84½
Beams, Pittsburgh	1.70	1.70	1.70	1.70
Angles, Tidewater, New York	1.86	1.86	1.86	1.84½
Angles, Pittsburgh	1.70	1.70	1.70	1.70
Skelp, Grooved Steel, Pittsburgh	1.70	1.70	1.70	1.65
Skelp, Sheared Steel, Pittsburgh	1.80	1.80	1.80	1.70
SHEETS, NAILS AND WIRE, Per Found:	Cents.	Cents.	Cents.	Cents.
Sheets, No. 27, Pittsburgh	2.50	2.50	2.50	2.50
Wire Nails, Pittsburgh	2.05	2.05	2.05	2.00
Cut Nails, Pittsburgh	2.00	2.00	2.00	2.05
Barb Wire, Galv., Pittsburgh	2.50	2.50	2.50	2.45
METALS, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake Copper, New York	*13.62½*	13.50	13.75	23.75
Electrolytic Copper, New York	*13.50*	13.37½	13.62½	23.25
Spelter, New York	*4.20*	4.30	4.60	6.67½
Spelter, St. Louis	*4.05*	4.20	4.45	6.55
Lead, New York	*3.75*	3.60	4.12½	6.30
Lead, St. Louis	*3.60*	3.50	4.00	6.05
Tin, New York	*27.25*	27.00	30.10	41.85
Antimony, Hallett, New York	*8.50*	8.50	8.75	25.00
Nickel, New York	45.00	45.00	45.00	45.00
Tin Plate, 100 lb., New York	$4.09	$4.09	$4.09	$4.09

* The price of $18.50 printed last week was the price at furnace.

Chicago.

FISHER BUILDING, December 31, 1907.—(*By Telegraph.*)

With no marked change in the general situation, save such as comes from continued financial improvement, there is none the less a more hopeful feeling prevalent concerning the trade outlook for the new year. True, there is nothing of a positive character in present market movements upon which to ground a firm prediction of an early trade revival; but with production reduced to a low ebb and no large surplus ahead, only a moderate demand is needed to start the tide running the other way. There is among consumers a deep seated conviction that prices on finished material will be readjusted to a lower basis on or soon after the first of the year. This feeling, combined with other causes, has exerted no little influence in restricting demand. It is not improbable, therefore, that steps may be taken at an early date to remove this obstacle and pave the way for a resumption of buying. Contracts aggregating over 2600 tons of fabricated material for building and bridges were closed last week and new work involving more than 6000 tons came in for figures. A permit for the Lasalle Hotel, representing a cost of $2,800,000, has been taken out and the contract for the Structural Material, amounting to 8000 tons, will soon be awarded. The combined incoming tonnage of new business and specifications on Sheets is extremely light, but because of the large number of mills shutdown or running short of capacity there is no threatened accumulation of stock. The Sylvan Mills of the Republic Iron & Steel Company, at Moline, Ill., started up December 30 after a shutdown of six weeks. While there is nothing to record in the way of not-

able Pig Iron transactions, the market gives evidence of a somewhat stronger feeling which has had the effect of, at least, preventing further demoralization of prices. The amount of tonnage placed during the week shows a slightly growing volume, but represents only purchases for present needs. The Scrap Iron market has not rallied from its weakness, but was spared the assault of fresh offerings of large tonnage, which was expected from railroad sources this week.

Pig Iron.—Although there have been no developments that would mark a positive turn in either direction, indications point to a little stronger feeling among furnace interests. There is no doubt that the sharp curtailment of output has helped to steady the market, and there is seemingly less disposition among sellers to gravitate toward lower price levels. An encouraging feature is observed in the fact that more of the inquiries received during the past week have resulted in sales. These ranged in amounts from car lots up to 500 tons, but of course the aggregate of tonnage taken was small. Of the numerous inquiries for from 500 to 3000 tons, a good proportion is believed to represent needs that must be supplied early in the first quarter. Notwithstanding the majority of consumers probably have enough stock in yards and due on postponed shipments to last them well through this period, there may be buyers enough who are not so supplied to start a spurt of buying early in the year. Beyond one inquiry for 1000 tons of Malleable Bessemer there is no indication of anything doing on this grade. Requirements of most of the Malleable melters were covered by contracts for last half requirements, and because of light consumption they are carrying over a good deal of tonnage. A slightly firmer tone is exhibited in the position of the Northern furnaces, which now declare their unwillingness to do better than $18.50 on No. 2 Foundry, although a minimum of $18 has been done. There is no question that some low prices have been made on Southern Irons, but it is doubtful if much tonnage for forward delivery can be placed at the extreme price of recent transactions. While it cannot be said what might be done on a specific offer of desirable tonnage, the attitude of sellers in this market would indicate that for strictly No. 2 grades $13.50, Birmingham, is at present the minimum, and a number of the important producers of that district are asking $14. The establishment of a firm, unyielding price, even though it be a peg above the recent low point, would go far to induce buyers to come into the market. The following prices are for January, February and March delivery, f.o.b. Chicago:

Lake Superior Charcoal	$23.50 to $24.00
Northern Coke Foundry, No. 1	19.00 to 19.50
Northern Coke Foundry, No. 2	18.50 to 19.00
Northern Coke Foundry, No. 3	18.00 to 18.50
Northern Scotch, No. 1	19.50 to 20.00
Southern Coke, No. 1	18.35 to 18.85
Southern Coke, No. 2	17.85 to 18.35
Southern Coke, No. 3	17.35 to 17.85
Southern Coke, No. 4	16.85 to 17.35
Southern Coke, No. 1 Soft	18.35 to 18.85
Southern Coke, No. 2 Soft	17.85 to 18.35
Southern Gray Forge	15.85 to 16.35
Southern Mottled	14.85 to 15.35
Malleable Bessemer	19.00 to 19.50
Standard Bessemer	21.00
Jackson Co. and Kentucky Silvery, 6 %	28.40 to 28.90
Jackson Co. and Kentucky Silvery, 8 %	30.40 to 30.90
Jackson Co. and Kentucky Silvery, 10 %	32.40 to 32.90

(*By Mail.*)

Billets and Rods.—The quiet movement of more highly finished lines is reflected in a greatly reduced demand for Billets. The character of orders received and the small tonnage involved indicates that purchases are being made only for urgent requirements. For business of this character Forging Billets continue to be quoted nominally at $33 to $34, Chicago. Wire Rods are unchanged at $34 to $35, Pittsburgh.

Rails and Track Supplies.—The closing week of the year has brought no reported developments in purchases of Standard Section Rails for 1908 delivery. The question of uncompleted purchases will, from present indications, doubtless occupy the attention of the roads in the near future, and it is unlikely that there will be insufficient tonnage to supply the rail making capacity of mills through the coming year. There is but little inquiry with few orders for Light Rails, the prices of which are revised on a basis of $2 a ton lower than the previous quotations. A slight improvement in the demand for Spikes, Bolts, and Track Supplies is observed in transactions of the past week. The volume of business involved, however, is relatively small. We quote as follows: Angle Bars, accompanying Rail orders, 1907 delivery, 1.65c.; car lots, 1.75c. to 1.85c.; Spikes, 1.90c. to 2c., according to delivery; Track Bolts, 2.40c. to 2.50c., base, Square Nuts; and 2.55c. to 2.65c., base, Hexagon Nuts. The store prices on Track Supplies range from 0.15c. to 0.20c. above mill prices. Light Rails, 25 to 45 lb. sections, $30; 20-lb., $31; 16-lb., $32; 12-lb., $34, f.o.b. mill. Standard Sections, $28, f.o.b. mill, full freight to destination.

Structural Material.—The placing of a contract for 830 tons of fabricated material, taken by E. Bolton & Sons, Chicago, for the E. S. Hunter Building, at Madison and Market streets, Chicago, though not of special significance on account of the tonnage involved, represents the conclusion of a transaction hitherto held up by the adverse condition of the money market. Through Bayne & Hewitt, general contractors, the American Bridge Company secured an aggregate of 1828 tons for the Fort Snelling Government bridge, Fort Snelling, Minn., and the Minnehaha Creek bridge, Minneapolis, Minn. In addition to the tonnage placed there has been new business figured on during the week to the extent of over 6000 tons, which gives promise of closure in the not distant future. Prices are without change.

Plates.—Only orders for small lots, which are evidently required to supply immediate needs, are coming in. Not much interest in future requirements is manifested either by consumers or jobbers. Store stocks are moving slowly, but prices on both mill and store shipments are fairly well maintained.

Sheets.—New business is coming in slowly, and shipments are light, although the inquiries received are of firmer tone and inspire hopes for a better demand as soon as the business of the new year is fairly under way. The radical restriction of output by manufacturers and harmony of action in competition has operated to sustain prices. As a result of a recent meeting of the independent interests it is expected that concessions of from $1 to $2 a ton heretofore made by a few mills will be discontinued. Store prices are unchanged and reasonably firm.

Bars.—With only a small portion of the mill capacity of this district in operation, business has been reduced to a low ebb. Such mills as are not wholly idle are running only intermittently. Specifications from all sources are coming forward very slowly, and in point of tonnage the new business offered is light. We quote: Steel Bars, 1.78c., with half extras; Iron Bars, 1.75c.; Hoops, 2.18c., extras as per Hoop card; Bands, 1.78c., as per Bar card, half extras; Soft Steel Angles and Shapes, 1.88c., half extras. Store prices are as follows: Bar Iron, 2.10c. to 2.25c.; Steel Bars, 2c. to 2.10c.; Steel Bands, 2c., as per Bar card, half extras; Soft Steel Hoops, 2.35c. to 2.45c., full extras.

Merchant Pipe.—The strongest feature of the situation seems to be that stocks in the hands of jobbers are below rather than above the normal. While orders being placed are not large, they are growing more frequent. There is good reason to believe that as soon as buyers are convinced of the stability of prices a buying movement will begin, which will result in the placing or tonnage contracts.

Boiler Tubes.—What demand there is is made up of small orders for current requirements. These are by no means large since there is not much new work in the boiler shops. Store trade, influenced by the same conditions, is of moderate volume.

Old Materials.—With no increase in consumption and a disinclination on the part of consumers to add to their present stocks, prices are weak and continue to sag. The tonnages offered in this market are necessarily more widely distributed than usual, since few buyers can be found who care to take any large lots. Melters are buying sparingly because of lessened consumption, and the mills have already accumulated a large amount of stock. A considerable quantity of railroad material which was expected to be offered this week did not make its appearance. It is perhaps fortunate for the market it was withheld, for in the present state of demand it would have borne heavily on values. We quote, per gross ton, f.o.b. Chicago, as follows:

Old Iron Rails	$15.00 to $15.50
Old Steel Rails, rerolling	12.00 to 12.50
Old Steel Rails, less than 3 ft	12.00 to 12.50
Relaying Rails, standard sections, subject to inspection	22.00 to 25.00
Old Car Wheels	20.00 to 20.50
Heavy Melting Steel Scrap	10.75 to 11.25
Frogs, Switches and Guards, cut apart	11.00 to 11.50
Mixed Steel	8.50 to 9.00

The following quotations are per net ton:

Iron Fish Plates	$13.00 to $13.50
Iron Car Axles	15.50 to 16.00
Steel Car Axles	15.00 to 15.50
No. 1 Railroad Wrought	10.50 to 11.00
No. 2 Railroad Wrought	9.50 to 10.00
Railway Springs	10.00 to 10.50
Locomotive Tires, smooth	15.50 to 16.00
No. 1 Dealers' Forge	8.50 to 9.00
Mixed Busheling	7.50 to 8.00
Iron Axle Turnings	6.75 to 7.25
Soft Steel Axle Turnings	7.00 to 7.50
Machine Shop Turnings	7.00 to 7.50
Cast Borings	4.75 to 5.25
Mixed Borings, &c	5.00 to 5.50
No. 1 Mill	7.00 to 7.50
No. 2 Mill	6.00 to 6.50
No. 1 Boilers, cut to Sheets and Rings	7.00 to 7.50
No. 1 Cast Scrap	12.75 to 13.25
Stove Plate and Light Cast Scrap	12.00 to 12.50
Railroad Malleable	10.00 to 10.50
Agricultural Malleable	9.50 to 10.00
Pipes and Flues	8.00 to 8.50

Merchant Steel.—Although at present exceedingly quiet as respects both new business and specifications against contracts, there are strong indications of a better

demand in January after inventories are taken. This movement will, perhaps, first take form in the reinstatement of postponed deliveries.

Cast Iron Pipe.—Trade is waiting first upon a positive and final solution of the financial situation, and second on the establishment of Pig Iron prices at a minimum level. It is believed that with the settlement of these questions much tonnage heretofore held back will begin to come out. Outside of a few small lots for maintenance and repairs, new business is extremely quiet. No new lettings of importance are reported. We quote, per net ton, Chicago, as follows: Water Pipe, 4-in., $33; 6 to 12 in., $32; 16-in. and up, $31, with $1 extra for Gas Pipe.

Metals.—The general inactivity of the holidays has contributed to the slowness in Metals as well as other lines. It was evident from the Copper orders, which ranged from 100 to 1000 lb., that buyers were taking only what they had to have for work in hand. Other metals were equally quiet, but with the exception of ½c. decline in Pig Tin, prices on the entire list are practically unchanged. We quote as follows: Casting Copper, 14c.; Lake, 14½c. to 15c., in car lots for prompt shipment; small lots, ¼c. to ⅜c. higher; Pig Tin, car lots, 29½c.; small lots, 30½c.; Lead, Desilverized, 4c. to 4.05c., for 50-ton lots; Corroding, 5.15c. to 5.25c., for 50-ton lots; in car lots, 2¼c. per 100 lb. higher; Spelter, 4½c.; Cookson's Antimony, 13c., and other grades, 11c. to 11½c.; Sheet Zinc is $7 list, f.o.b. La Salle, in car lots of 600-lb. casks. On Old Metals we quote: Copper Wire, 13½c.; Heavy Copper, 13½c.; Copper Bottoms, 12c.; Copper Clips, 12c.; Red Brass, 13c.; Yellow Brass, 10½c.; Light Brass 6½c.; Lead Pipe, 3¾c.; Zinc, 3¾c.; Pewter, No. 1, 21c.; Tin Foil, 23c.; Block Tin Pipe, 25c.

Philadelphia.

PHILADELPHIA, PA., December 30, 1907.

The Iron and Steel markets are very quiet, which is characteristic of the closing days of the year. Consumers are occupied with their annual inventories, and mills in many cases have been closed down for the holidays, while repairs are being made, and to facilitate the taking of stock accounts. But little attention has therefore been given to the purchase of supplies, and not much new business is expected until toward the middle or latter part of January. Financial conditions continue to be an important factor, and while the situation shows further slight improvement, it is still far from normal, and a marked gain in the demand for Iron and Steel can hardly be looked for until the money market is on a more satisfactory basis.

Pig Iron.—There has been a somewhat better inquiry for Pig Iron, and the number of buyers in the market appears to be increasing. As was generally expected, the closing week of the year was rather dull as far as actual sales are concerned, there being a general disposition to defer the placing of orders until after the turn of the year. Prices continue to show a tendency toward weakness, sellers being willing to shade a bit for fair tonnages, particularly where it is necessary to keep furnaces in blast to take care of business still on the books. Curtailment of Pig Iron production continues, and the month of December will show, in all probability, the smallest output for a long time. Sales of Foundry Iron have been mainly of small lots, ranging from carloads up to a few hundred tons, some of it for delivery in the first quarter and half of 1908. No. 2 X Foundry has been sold at from $18 to $18.50, delivered, mostly, however, for early delivery. Pipe makers have shown more interest in the market recently, and several sales of 1000-ton lots have recently been made of suitable grades for their use at prices close to $16.25, delivered. Forge Iron has not been active, although there has been some inquiry for future delivery. Mills as a rule are not in the market to any great extent, owing to the general suspension of operations. Sellers would not be unwilling to shade prices a bit for good tonnages, and $16.25 to $16.50, delivered, could readily be done. Basic Iron continues rather quiet, there being but little demand, and while quotations have been nominally $17.25 to $17.50, sellers would accept $16.50 to $16.75 on good orders. There is some inquiry for Low Phosphorus Iron, but actual orders have been light. Prices for delivery in buyers' yards, eastern Pennsylvania and nearby territory, for the early portion of the year, are quoted as follows:

No. 2 X Foundry	$18.00 to $18.50
Gray Forge	16.25 to 16.50
Basic	16.50 to 16.75
Low Phosphorus	25.00 to 25.50

Ferromanganese.—There is no movement in Ferromanganese, the market being extremely quiet. Quotations are unchanged, $48 to $49, Baltimore, being named.

Steel.—Orders have not yet been received in sufficient quantity by makers to warrant the restarting of mills, and they will not resume until the demand improves. Sales are extremely light, and there is nothing around for forward delivery. Prices are nominally unchanged, ordinary Rolling Steel being quoted at $30 to $31, while $33 to $35 is still quoted for Forging Billets. Orders for a round tonnage, however, could be placed at somewhat lower figures.

Plates.—The makers of Plates have felt the effect of the holidays, and little new business has been taken. The prospects, however, are somewhat brighter. Orders will shortly be placed for 2500 tons of Plates for bridge work on the new elevated tracks for the Philadelphia & Reading Railroad, the contract for which was awarded early in the week. Shipbuilders are figuring on several boats, and other Plate users have considerable work in hand, and in view, but orders for the Plates are largely being withheld until after the first of the year. Prices are firmly maintained as follows:

	Carload. Cents.	Part carload. Cents.
Tank, Bridge and Boat Steel	1.85	1.90
Flange or Boiler Steel	1.95	2.05
Commercial Firebox	2.05	2.10
Marine	2.25	2.30
Locomotive Firebox Steel	2.35	2.40
The above are base prices for ¼-in. and heavier. The following extras apply:		Extra per 100 lb.
3-16-in. thick		$0.10
Nos. 7 and 8, B. W. G		.15
No. 9, B. W. G		.25
Plates over 100 to 110 in		.05
Plates over 110 to 115 in		.10
Plates over 115 to 120 in		.15
Plates over 120 to 125 in		.25
Plates over 125 to 130 in		.50
Plates over 130 in		1.00

Structural Steel.—The demand has not been very heavy during the week. Mills have a fair amount of business on hand, however, and the suspension for the holidays was of short duration. The outlook is encouraging. Some good orders are in sight, and it is believed that a moderate volume of business will continue to come out. Prices are fully maintained, being quoted at 1.85c. to 2c., according to specification. The Philadelphia & Reading Railroad Company has awarded, under what is known as contract No. 8, the bridges to be built in connection with its elevated railroad between Berks street and Broad street, to the McClintic-Marshall Construction Company, Pottstown, Pa., for $336,785. As previously stated, some 5000 tons of Plates and Shapes will be required in this work, orders for which, it is understood, are still to be placed with the makers.

Bars.—Mills are practically all shut down. When they will resume depends entirely on the demand. Sales have been light and makers have been largely able to take care of current business from stock. Prices are being maintained at 1.75c. for Philadelphia and nearby delivery. Steel Bars are quoted at the same price, but there is little business being done.

Sheets.—There has been no improvement in the demand and mills are still idle. What little business comes in is for immediate delivery, and is taken care of from stocks on hand. No disposition is shown on the part of buyers to place orders for forward delivery, although makers believe the situation in this respect will improve early in the coming year. Prices for mill shipments are quoted as follows, with a tenth extra for small lots: Nos. 18 to 20, 2.80c.; Nos. 22 to 24, 2.90c.; Nos. 25 to 26, 3c.; No. 27, 3.10c., and No. 28, 3.20c.

Old Material.—Business is at a standstill. The low prices do not attract buyers, and dealers are waiting further developments. In the absence of business, prices are unchanged, and are quoted nominally for prompt shipment only, about as follows, for delivery in buyers' yards, eastern Pennsylvania and nearby territory:

No. 1 Steel Scrap and Crops	$11.50 to $12.00
Low Phosphorus	16.00 to 16.50
Old Steel Axles	18.50 to 19.00
Old Iron Axles	23.00 to 24.00
Old Iron Rails	17.50 to 18.00
Old Car Wheels	19.00 to 20.00
Choice No. 1 R. R. Wrought	14.50 to 15.00
Machinery Cast	15.50 to 16.00
Wrought Iron Pipe	12.50 to 13.00
No. 1 Forge Fire Scrap	11.50 to 12.00
No. 2 Light Iron	8.00 to 8.50
Wrought Turnings	9.00 to 9.50
Stove Plate	12.50 to 13.00
Cast Borings	7.00 to 7.50
Grate Bars	13.00 to 13.50

Coke.—There is not a great deal of movement in the Coke market. Makers have considerable Coke on hand, but production has been materially curtailed. Furnace Coke is quotd at $2, at oven, for spot delivery, and $2 to $2.25 for forward delivery. Foundry Coke commands $2.50 to $2.75, at oven, any delivery. These prices apply to both Connellsville and Mountain Coke. The freight rate to Philadelphia and nearby points, however, is higher on the former than the latter, so that delivered prices would range about as follows:

Connellsville, Furnace Coke	$4.15 to $4.40
Foundry Coke	4.65 to 4.90
Mountain Furnace Coke	3.85 to 4.15
Foundry Coke	4.35 to 4.60

Cincinnati.

CINCINNATI, OHIO, December 31, 1907.—(*By Telegraph.*)

The turn of the year finds a sentimental balance on the side of the optimists, and there is a feeling among all factors from crude to finished product that the bottom has been reached, and it is but a question of hours rather than days or weeks ere the pace is upward, instead of, as for months, downward. This opinion is formulated from mingling with the men who make the market, who are familiar with all its eccentricities and follow more closely than anybody else the various conditions which have a bearing on prices and sales. The reports from the South that a gentleman's agreement is in process of making, fathered by the Steel people, to fix the minimum price of Southern Iron on a basis of $14, finds few interested here, not only because of experience which teaches that when the bottom has been reached a strong recovery has been the rule within 12 to 24 hr., but because principally of the unusual conditions which marked production this year when business began to drop off. Never before have there been such restrictions, such wholesale banking and blowing out of furnaces, with but a pittance of Iron on furnace yards and comparatively none in the possession of the melters. Because buying has been of the hand to mouth order for several months, there is little need for any concerted movement at this time. January 6 has been fixed as the date upon which many idle or partly idle plants will begin operations, and as Iron has been used up to the barest degree buying for quick delivery will be a feature.

Pig Iron.—While there are few actual sales reported, inquiries have increased wonderfully, and sellers are getting in readiness for a strong buying movement. Some very recently returned visitors to the Birmingham District report practically no Iron in furnace yards, and but nine stacks in blast in the Birmingham and six in the Tennessee districts. In the Hanging Rock District there is but one in blast, the Nellie, and that, it is said, will be banked in the next few days. With the very limited amount of Iron in furnace yards, and practically all resale Iron claimed out, there is a feeling among Iron factors that buyers will come from under cover very soon, and market letters are being sent from many sources advising purchases. While the price of $13 on Southern No. 2 Foundry is generally conceded as having been done, and there is said to be some tonnage now in negotiation for January delivery at the same rate, a number of orders offered at that figure are said to have been refused by leading Southern furnace companies, which make a $13.50 price as the minimum for prompt or first quarter delivery, while some of them are even demanding $14 and $15. The same conditions prevail as to the Northern product which, while quoted at $16.50 for prompt delivery, is difficult to contract at a less price than $17. A Hamilton, Ohio, melter is in the market for a 200-ton lot of Southern No. 4. There will be little contract Iron in dispute at the turn of the year, for most last quarter deliveries not needed by the melter have been extended by the selling agents or sold for his account, and there was no trouble on the part of the furnaces during the last quarter in supplying all demands. For prompt shipment and for the first quarter of 1908 we quote, f.o.b Cincinnati, as follows, the freight rates being from Birmingham $3.25, and from the Hanging Rock District $1.20:

Southern Coke, No. 1	$16.75 to $17.25
Southern Coke, No. 2	16.25 to 16.75
Southern Coke, No. 3	15.75 to 16.25
Southern Coke, No. 4	15.25 to 15.75
Southern Coke, No. 1 Soft	16.75 to 17.25
Southern Coke, No. 2 Soft	16.25 to 16.75
Southern Coke, Gray Forge	14.75 to 15.25
Southern Coke, Mottled	14.25 to 14.75
Ohio Silvery, 8 per cent. Silicon	23.70 to 24.20
Lake Superior Coke, No. 1	18.20 to 18.70
Lake Superior Coke, No. 2	17.70 to 18.20
Lake Superior Coke, No. 3	17.20 to 17.70

Car Wheel Irons.

Standard Southern Wheel	$25.75 to $26.25
Lake Superior Car Wheel	26.50 to 27.00

Coke.—There is no marked change in Coke. Production is reported to be increasing somewhat, and the better brands of Foundry are in fair demand. The range is about $2.75 to $3.25 at oven, and Virginia furnace grades about $2 to $2.25 at oven. It is reported that some melters have come into the market for first quarter and half requirements, and that the above prices have been shaded a little on good sized tonnages.

Finished Iron and Steel.—Holiday week finds a number of the Iron stores invoicing and getting ready for the new year. There is practically no business going, save small purchases for immediate requirements, which are promptly supplied from stores. The largest of these are occupied with collections which are not excellent, attributable by some dealers to the position of the banks in advising customers. Prices are unchanged. Dealers quote f.o.b. Cincinnati, as follows: Iron Bars, carload lots, 1.80c., with half extras; small lots from store, 1.85c., base, full extras; Steel Bars, carload lots, 1.75c., base, half extras; small lots from store, 1.85c., base, full extras; Base Angles, carload lots, 1.75c.; small lots from store, 2.10c.; Beams, Channels and Structural Angles, 1.85c., base; small lots from store, 2.10c.; Plates, ¼-in. and heavier, carload lots, 1.95c.; small lots from store, 2.20c.; Sheets, No. 16, carload lots, 2.20c.; small lots from store, 2.50c.; No. 14, carload lots, 2.10c.; small lots from store, 2.40c.; Steel Tire, 4-in. or heavier, carload lots, 1.95c., base; Plates, 3-16 and No. 8, carload lots, 2c.; small lots from store, 2.25c.; Sheets, No. 10, 2c., carload lots; 2.30c. from store; Sheets, No. 12, 2.05c., carload lots; 2.35c. from store; Light Sheets, Black, No. 28, carload lots, 2.75c.; Galvanized, No. 28, 3.90c.

Old Material.—Scrap dealers are not confident as to the immediate future, and most of them are simply waiting. There is not enough business to warrant a schedule of prices that would represent the real market value of material in any kind of demand, and the quotations appended are given as the best obtainable under the circumstances, and are f.o.b. Cincinnati:

No. 1 Railroad Wrought, net ton	$10.50 to $11.00
Cast Borings, net ton	3.50 to 4.50
Steel Turnings, net ton	5.00 to 6.00
No. 1 Cast Scrap, net ton	12.00 to 13.00
Burnt Cast and Wrought, net ton	7.00 to 8.00
Old Iron Axles, net ton	15.00 to 16.00
Old Iron Rails, gross ton	15.00 to 16.00
Old Steel Rails, long, gross ton	10.50 to 11.00
Relaying Rails, 56 lb. and up, gross ton	21.00 to 22.00
Old Car Wheels, gross ton	16.00 to 17.00
Low Phosphorus Scrap, gross ton	13.50 to 14.50

San Francisco.

SAN FRANCISCO, December 24, 1907.

The special bank holidays came to an end December 21, and with the full resumption of banking business on the usual scale this week, confidence has been largely restored. Business prospects are brighter and the Iron and Steel trade is already feeling the effects of the decided improvement. Stocks have been steadily diminished by moderate consumption, and as soon as it is known where the money is coming from, the dealers will be encouraged to buy more heavily in these lines. Mining business has been hit hard by the labor troubles at Goldfield, Nev., so that local foundries and engineering works have had comparatively few orders for castings and repair parts since the financial stringency began. A gradual recovery is looked for, although the future actions of the Western Federation of Miners, in working or forcing labor disturbances, will have much to do with it. The arrival of the Federal troops at Goldfield improved the situation. The financial stringency following the Wall Street panic had the effect of bringing many new projects, such as electric railroads, electric power plants and embryo manufacturing enterprises, to a standstill for lack of funds to carry the plans to completion. Money is now somewhat easier, and some of the new infant industries will yet be placed on their feet, while others may be nipped in the bud. An attempt has been made in Southern California to block the $23,000,000 bond issue of the city of Los Angeles for its Owens River water project. On this system some preliminary work has been done, and deliveries are being made on a 6000-ton contract for Cast Iron Pipe for improving the local distribution of water. What is understood to be the first of 14 suits which will be begun against the city of Los Angeles to prevent the construction of the Owens River aqueduct has been begun in Inyo County, California, by the Inyo Consolidated Water Company. The complaint holds that the city of Los Angeles owns only 180 in. of the flow of Cottonwood Creek, a tributary of Owens River, and demands that the city be required to show cause why it should not be restrained from asserting further rights. The plaintiff claims 130,000 in. of the flow perpetually. The large electrical corporations operating in that part of California are understood to be behind the suit. Preparations are on foot for the construction of a telephone system along the line of the projected 240-mile aqueduct.

Pig Iron.—The market is still very inactive, and there is no change in prices of Pig Iron locally. Importations by sea from Europe have been light in December, but a number of vessels are now en route to this port with from 1000 to 1500 tons each. Girvin & Eyre recently imported a cargo of Coke and Pig Iron from England, the latter including 750 tons of Glengarnock and 250 tons of Eglinton.

Coke.—Arrivals of foreign Coke by sea during November and early in December have made a good showing as to quantity, and have had a tendency to depress prices somewhat. December arrivals to date aggregate about 9740 tons, which, with the exception of one cargo of 2840 tons, from Australia, was from Europe.

Structural Material.—While no large contracts for Structural Steel for buildings in San Francisco have been closed very recently, there is some inquiry, and the prospect is good for the erection of a large number of Steel frame structures in 1908. The only unfavorable feature is the possibility of labor troubles in the building trades, to which any city is liable. The San Francisco Building Trades Council has clashed with the local representatives of D. O.

Mills, and of D. H. Burnham & Co., over the reconstruction of the Mills Building, which is nearly ready for occupancy. The point at issue is whether the elevator workers or the steam fitters shall install the pipe connections to the elevator apparatus. It is reported that the affair is really the beginning of a battle for local supremacy between the presidents of the Building Trades Council and the American Federation of Labor. Strong influences will be brought to bear by the contractors and material men of the city to prevent a general tie-up of building operations in case the trouble extends further. According to the plans just adopted by the Royal Insurance Company for a new 10-story Class A office building on the corner of Pine and Sansome streets, a considerable quantity of Structural Steel will be required. The Palace Hotel Company has awarded contracts aggregating $144,260 to Winslow Brothers' Company and the Otis Elevator Company for the ornamental Iron and elevator work for the new eight-story hotel on Market street. The W. B. Abbitt Company has taken the riveting contract on the Steel frame at $9 per ton.

Merchant Pipe.—The jobbing conditions in Merchant Pipe have not changed materially since last report. Stocks are being reduced, however, and buying cannot be postponed much longer. Discounts on Steel Pipe are about as follows on jobbers' carloads:

	Steel.	
	Black.	Galv.
⅛ and ¼ in	58.5	42.5
⅜ in	60.5	46.5
½ in	62.5	50.5
¾ to 6 in	66.5	56.5
7 to 12 in	63.5	48.5
Extra strong, plain ends:		
⅛ to ⅜ in	51.5	39.5
½ to 4 in	58.5	46.5
4½ to 8 in	54.5	42.5
Double extra strong, plain ends:		
½ to 8 in	47.5	36.5

Cast Iron Pipe.—Only a few small inquiries have been received of late for Cast Iron Pipe, but a number of municipalities and water companies in California and other Coast States are planning extensions that will require a good deal of Pipe in the new year. The city of Los Angeles has purchased 1000 acres of land at the head of the San Fernando Valley as a site for twin storage reservoirs for the waters of the Owens River, to impound 10,000,000,000 gal. of water. This space supply would be sufficient for the city's needs for six months in case of injury to the conduit system.

The electric furnace at Héroult, Cal., has closed down after a successful run of two weeks on Ferrosilicon. The shutdown is only temporary. The furnace will start up when electrodes now on the way from the East arrive, which will be in about 10 days, according to present calculations. By that time the track of the Sacramento Valley & Eastern Railroad will be laid to the furnace, facilitating the shipment of the stock of Pig Iron and Ferrosilicon now in the furnace yards. A 250-hp. transformer is being installed at this furnace. The transformer was made under the direction of Professor Dorsey A. Lyon of Stanford University. He is also the designer of a new and larger furnace that is almost completed in San Francisco, and will soon be shipped to Héroult, and has been granted six months' leave of absence from the university, in order that he may devote that much time to the Héroult enterprise. His furnace is said to be an improvement on the design of Dr. Héroult.

The Shelby Steel Tube Company will, in future, market its products on the Pacific Coast through the National Tube Company, represented in San Francisco by G. S. Garritt, sales manager, with offices in the Crocker Building.

W. P. Barba, the metallurgical engineer of the Midvale Steel Company, Philadelphia, has returned East, after making an inspection tour of the principal mining mills and smelters of the Pacific Coast, in company with J. C. H. Ferguson, the general sales manager, with headquarters in San Francisco. While business is still very dull in the lines of Castings, Steel Bars, &c., required by the plants above referred to, these investigators were convinced that there is a probability of a decided improvement within the next three months.

The Union Iron & Steel Company, whose main office is at 71 Broadway, New York, and works are at Ironton, Ohio, and Big Gap, Va., has succeeded in having dismissed the petition in bankruptcy filed against it November 14. Judge Hough of the United States District Court, New York, took this action on the ground that there were not three creditors with provable claims who filed the petition.

To extinguish a mine fire with carbon dioxide gas, it is stated that 7 per cent. of a mine's capacity must be filled.

Cleveland.

CLEVELAND, OHIO, December 30, 1907.

Iron Ore.—As a result of the limited consumption of Ore, the piles on the docks are scarcely being touched. Because of the curtailment of the production of Pig Iron a large number of furnaces will have considerable Ore on hand at the opening of navigation next spring. The amount of this surplus will depend, of course, on the length of time the furnaces will be compelled to stay out of blast. The existing conditions indicate a considerable falling off in Ore purchases and shipments next year, for furnaces that have enough Ore to last them until well along in the summer will not buy so much as they would if their supply ran out two or three months earlier. In view of the conditions, it is certain that this year's record breaking Ore movement will not be equaled next year. The all rail Ore movement in 1907 was approximately 850,000 tons, making the total shipments for the year, in round figures, 42,150,000 gross tons. During 1907 lake shipbuilders launched 44 vessels, which is regarded as a very satisfactory record, considering the fact that a number of plants were tied up by labor troubles early in the year. With about four exceptions all the boats that were ordered for 1907 delivery were turned out. Three freighters that were completed late in the season were not placed in commission because of the falling off in freight movement late in the season. Of the 44 vessels built, 41 were bulk freighters, their average capacity being about 9000 tons. Many of the new boats came out late in the season and made but a few trips. No interest is as yet being aroused in 1908 Ore, and nothing is being done about fixing prices. Nominal prices remain as follows at Lake Erie docks, per gross ton: Old Range Bessemer, $5; Mesaba Bessemer, $4.75; Old Range Non-Bessemer, $4.25; Mesaba Non-Bessemer, $4; Siliceous Bessemer, $2.75; Siliceous Non-Bessemer, $2.35 to $2.60.

Pig Iron.—Considerably more inquiry for Northern Foundry Iron for the first quarter and first half of 1908 has developed during the week. The inquiries are mostly from foundries that are figuring on contracts for castings and want quotations on which to base those contracts. The inquiries are for lots ranging from 100 to 1500 tons. A number of the foundries ask for quotations both for the first half and for prompt shipment, indicating that some of them are disposed to buy only for their immediate needs instead of making contracts for three or six months. Many of the local consumers have enough Iron in stock or under contract to last two or three months. The ruling price seems to be $17, Valley furnace, for No. 2 Foundry Iron for prompt shipment and for the first quarter and first half delivery. One local furnace is asking $17.50 for prompt shipment and for first quarter and first half. One local interest reports a little better demand for spot Iron at its Eastern furnaces, having made some sales in 50 to 100 ton lots at from $17 to $17.15, at furnace, for No. 2. Taken altogether, the demand for spot Iron, however, shows no improvement, and unless there is a change for the better other furnaces will go out of blast within a week or two. Ella Furnace of Pickands, Mather & Co. will be blown out January 1, and it is expected that the Dover Furnace of the Penn Iron & Coal Company will be blown out in a day or two. Other furnaces that have gone out of blast in addition to those previously noted are the furnaces of the Perry Iron Company, Erie, Pa., and of the Detroit Iron & Steel Company, at Detroit. Corrigan, McKinley & Co. have decided to rebuild their Scottdale Furnace, which was shutdown a few days ago as the result of a breakout. The furnace, which was a very old one, is now being torn down. The River Furnace of the Upson Nut Company, which has been banked for about three weeks for repairs, will start up January 2. This furnace has enough shipping orders on hand to keep it running for a few weeks. There are a number of inquiries in the local market for Southern Iron for first half delivery, including one for several hundred tons of No. 2 Soft from a stove interest. Quotations for prompt shipment, f.o.b. Cleveland, are as follows:

Bessemer	$19.90
Northern Foundry, No. 1	$17.50 to 18.00
Northern Foundry, No. 2	17.00 to 17.50
Northern Foundry, No. 3	16.50 to 17.00
Southern Foundry, No. 2	17.85 to 18.35
Gray Forge	17.40

Coke.—A local furnace interest closed a contract last week for about 40,000 tons of Furnace Coke for the first half of 1908 at a price slightly under $2, at oven. With the exception of this transaction the market has been lifeless. Price quotations are largely nominal. For first quarter and half delivery we quote Furnace Coke at $2 to $2.15, at oven, and Connellsville Foundry Coke at $2.75 to $3.25, at oven.

Finished Iron and Steel.—Collections are much better, and banks are easing up a little more on money. The satisfactory change in financial conditions leads to the belief that business in the Iron and Steel trade will pick up materially soon after the first of the year, but a rapid return to normal activity is not expected. A fair volume of orders is looked for, however, late in January. Many in-

dustrial plants that have been running on reduced capacity shut down during the holidays and are taking stock. A large portion of them are expected to resume soon after the first of the year, and their resumption will be quickly followed by a better demand for Finished Material, as most consumers have a very limited stock on hand. The full resumption of work by the American Shipbuilding Company, which is expected soon after the turn in the year, will help considerably in restoring the normal volume of orders on contracts. Some of the sales agents of mills report that owing to the business depression during the latter part of the year many of their customers have not specified for over about 25 per cent. of the material that they had purchased under contracts that expire January 1. The plant of the Otis Steel Company, which shut down last week for repairs, started up again this week. The mills of the Union Rolling Mill Company and Empire Rolling Mills Company, Cleveland, which shut down before Christmas, are still idle, and it is uncertain when they will start up, that depending on when they receive enough orders to warrant a resumption. There are some inquiries for Iron Bars from railroads which are expected to place their orders this week. Following the policy adopted by Eastern Bar Iron manufacturers, an attempt has been made by some of the Western Bar Iron mills to maintain prices at 1.60c., Pittsburgh. The attempt has met with but slight success, however, and orders could, doubtless, be placed with local mills on the basis of 1.55c., Pittsburgh. There is some demand for Light Rails for coal mines in car lots, on which mills rerolling Rails are cutting prices $2 or more per ton. Some independent mills are shading prices $2 per ton on Light Plates, and prices are also being shaded on Black and Galvanized Sheets. We quote Steel Bars at 1.70c., Cleveland, for carload lots, half extras; Beams and Channels, 1.80c., base, Cleveland, and Plates, ¼ in. and heavier, 1.80c., base, Cleveland. Regular mill prices on Sheets, carload lots, Cleveland, are as follows: Blue Annealed, No. 10, 1.95c.; Box Annealed, No. 28, 2.70c.; Galvanized, No. 28, 3.85c. Jobbers report light sales, with no change in prices. We quote Steel Bars, out of stock, at 1.90c. to 1.95c., and Iron Bars at 1.95c. to 2c. Beams and Channels, out of stock, are 2.10c. to 2.15c., base. Warehouse prices on Sheets are as follows: Blue Annealed, No. 10, 2.20c.; Box Annealed, No. 28, 2.90c.; Galvanized, No. 28, 4.05c. Warehouse prices on Boiler Tubes, 2¾ to 5 in., are 64 per cent. discount, and on Black Merchant Iron Pipe, base sizes, 67 per cent. discount.

Old Material.—The market shows no improvement. A number of mills are shut down for the holidays, and those that have bought any Scrap during the week have wanted only car lots for immediate use. Dealers have expected some buying for the first of the year delivery, but as yet have received no inquiries from the mills for Scrap for January shipment. Nominal prices remain about the same. Dealers believe that the bottom has been reached and there is some speculative buying. The sale of 1000 tons of Scrap by the Lake Shore Railroad last week is said to have brought out somewhat better prices than any similar sale in the past six weeks. A local manufacturing concern sold 500 tons of Busheling of a superior quality at $12 and 300 tons of Turnings at $7.50. Dealers' prices to the trade, per gross ton, f.o.b. Cleveland, are as follows:

Old Steel Rails	$11.00 to $11.50
Old Iron Rails	16.00 to 17.00
Steel Car Axles	18.00 to 19.00
Old Car Wheels	16.00 to 17.00
Relaying Rails, 50 lb. and over	25.50 to 26.00
Relaying Rails, under 50 lb.	28.00 to 29.00
Heavy Melting Steel	11.00 to 11.50
Railroad Malleable	12.00 to 13.00
Agricultural Malleable	11.00 to 12.00
Light Bundled Sheet Scrap	9.00 to 10.00

The following quotations are per net ton, f.o.b. Cleveland:

Iron Car Axles	$17.00 to $18.00
Cast Borings	4.50 to 5.00
Iron and Steel Turnings and Drillings	6.50 to 7.00
Steel Axle Turnings	7.50 to 8.00
No. 1 Busheling	10.50 to 11.00
No. 1 Railroad Wrought	11.00 to 12.00
No. 1 Cast	12.00 to 13.00
Stove Plate	10.00 to 10.50
Bundled Tin Scrap	9.00

The first turbine propelled United States battleship will be No. 29, now building. It will also have an interesting electrical equipment, including four 300-kw. Curtis turbogenerating sets, supplying light and power to 100 motors of sizes ranging from 2 to 75 hp.

Regarding structural steel tests, Professor Arnold, in a lecture before the Sheffield Society of Engineers, England, recommended abandoning the breaking stress as the basis for the factor of safety, and using instead, four tons less than the elastic limit with a factor of safety of at least three.

Pittsburgh.

PARK BUILDING, December 31, 1907.—(*By Telegraph.*)

Pig Iron.—While there is a little more inquiry for Steel making Iron, little tonnage has been actually closed. One Eastern Steel company is inquiring for 3000 tons of Bessemer, another for 2000 tons and a third for 1000 tons, all for January and February shipment. On these inquiries $18.50 at Valley Furnace is being quoted, equal to $19.40, Pittsburgh. Reports are that Basic Iron has been sold as low as $17, Valley Furnace, but this is not confirmed. The furnace interests are trying to maintain a differential of $1 a ton between Bessemer and Basic. We quote Bessemer Iron at $18.50, Valley Furnace, and Basic at $17.50, Valley Furnace, freight to Pittsburgh being 90 cents. Inquiries for Foundry Iron are few and only for small lots. We quote Northern No. 2 Foundry for first quarter delivery at $17, Valley Furnace, or $17.90, Pittsburgh, but several makers of Iron having a high reputation among consumers are not quoting below $17.50, Valley Furnace. A local consumer has bought 1500 tons of Northern Forge Iron at $16.75, Valley Furnace, or $17.65, Pittsburgh, and we quote the market at that price.

Steel.—The market is very quiet, and the output of Steel is at the lowest point for some years. The Carnegie Steel Company has seven plants closed down—Columbus, Mingo Junction, Bellaire, North and South Sharon and Ohio. The Shenango Steel Works of the Carnegie Company, at New Castle, idle last week, started up on Monday morning this week, rolling Sheet and Tin Bars. We continue to quote Bessemer and Open Hearth Billets nominally at $28, and Sheet and Tin Bars at $29, Pittsburgh. Consumers of Forging Billets are said to be specifying more freely against contracts. We quote Forging Billets at $30, Pittsburgh.

(*By Mail.*)

The close of the year finds general conditions in the Steel trade a little better. There are more inquiries in the market for Pig Iron, Steel and Finished Material. The new tonnage actually contracted for, however, continues very light, and does not represent more than 25 per cent. of the capacity of the mills, if that much. Reports are current of readjustments in prices of nearly all lines of Finished Iron and Steel to become effective early in January, possibly before this week is out, but from reliable sources, it is learned, that the only reductions in prices definitely decided upon are on Galvanized Sheets, which will be reduced, owing to the heavy decline in the price of Spelter, and also Tin Plate, due to the much lower cost of Tin. The reduction in Galvanized Sheets will be $3 or $4 a ton, and on Tin Plate probably 25c. per base box. It is possible, too, that Black Sheets will be reduced. Official notice of these reductions will likely be sent to the trade by the Sheet and Tin Plate interests before this week is out. In regard to Plates, Structural Material, Steel Bars and Pipe, while it is possible that reductions on these products may be made in February or March, it is not believed that any change will be made in January. Restriction in the output of Pig Iron, Steel and Finished Material is still going on, and at the end of this week it is expected that only four or five of the Valley furnaces, which sell their Pig Iron in the open market, will be in blast. Another meeting of the furnace interests making Foundry Iron was held in Cleveland, Ohio, December 28, at which a report of the committee appointed at the previous meeting was presented. The furnaces west of the Allegheny Mountains that make Foundry Iron are working closely together in restricting output and sustaining prices. A meeting of the subcommittee representing the American Sheet & Tin Plate Company and the independent Sheet and Tin Plate mills will be held in Pittsburgh, January 2, at which time it is probable that the readjustments decided upon in the prices of Black and Galvanized Sheets and Tin Plate will be announced.

Ferromanganese.—No new business is being placed, and we quote 80 per cent. foreign Ferro nominally at $50 to $51, Pittsburgh. Possibly these prices could be shaded.

Muck Bar.—Northern Forge Iron has sold recently as low as $16.75, Valley furnace, equal to $17.65, Pittsburgh, and this fully explains the low prices at which Bar is being offered. We quote best grades of Muck Bar made from all Pig Iron at $29 to $30, Pittsburgh.

Wire Rods.—We do not hear of any orders being placed, and we quote Bessemer and Open Hearth Rods at about $34, Pittsburgh.

Steel Rails.—Some inquiries are in the market for small lots of Standard Sections, ranging from 2000 to 5000 tons, but the terms of payment offered by the prospective purchasers, which are usually bonds or some other forms of securities, are not satisfactory to the Rail mills, and the business is usually declined. The Edgar Thomson mill of the Carnegie Steel Company is again in operation, but is running light, making only 1000 to 1200 tons a day against a normal capacity of at least 2500 tons. New tonnage in Light Rails being placed is being taken mostly by the mills that reroll Rails, on which low prices are made, 25 lb. to

45 lb. Rails having sold recently as low as $27, at mill. Usual quotations are as follows: 25 to 45 lb., $30; 20-lb., $31; 16-lb., $32; 12-lb., $34; 10-lb., $36, and 8-lb., $40. We quote Standard Sections at $28, at mill, and Angle Splice Bars at 1.65c.. at mill.

Plates.—The Steel car companies and the Standard Oil Company are still taking out a fairly heavy tonnage of Plates, but the demand from other consumers is very light. The Steel car interests have orders for about six weeks yet, but after that time their requirements for Plates will be very small, unless they receive some orders for cars in the meantime. Some Plate mills that do not make a full range of sizes are shading prices on narrow Plates about $2 a ton. We quote: Tank Plates, ¼-in. thick, 6¼ in. up to 100 in. wide, 1.70c., base, at mills, Pittsburgh. Extras over this price are as follows:

	Extra per 100 lb.
Gauges lighter than ¼-in. to and including 3-16-in. Plates on thin edges	$0.10
Gauges Nos. 7 and 8	.15
Gauge No. 9	.25
Plates over 100 to 110 in	.05
Plates over 110 to 115 in	.10
Plates over 115 to 120 in	.15
Plates over 120 to 125 in	.25
Plates over 125 to 130 in	.50
Plates over 130 in	1.00
All sketches (excepting straight taper Plates varying not more than 4 in. in width at ends, narrowest end being not less than 30 in.)	.10
Complete Circles	.20
Boiler and Flange Steel Plates	.10
"A. B. M. A." and ordinary Firebox Steel Plates	.20
Still Bottom Steel	.30
Marine Steel	.40

Shell grade of steel is abandoned.

TERMS.—Net cash 30 days. Pacific Coast base, 1.60c., f.o.b. Pittsburgh, with all rail tariff rate of freight to destination added, no reduction for rectangular shapes, 14 in. wide down to 6 in. of Tank, Ship or Bridge quality.

Structural Material.—Inquiries are reported as a little better and some tonnage has been placed. The McClintic-Marshall Construction Company has taken a contract from the Philadelphia & Reading Railroad for the elevation of its four track system in Philadelphia, about 4200 tons; also some bridge work from the Pennsylvania Railroad, about 500 tons, and additional Steel work for the new Open Hearth plant of the Pittsburgh Steel Company at Monessen, Pa., about 500 tons, all this material to be rolled by the Carnegie Steel Company. We quote: Beams and Channels, up to 15 in., 1.70c.; over 15 in., 1.80c.; Angles, 3 x 2 x ¼ in. thick, up to 6 x 6 in., 1.70c.; 8 x 8 and 7 x 3½ in., 1.80c.; Zees, 3 in. and larger, 1.70c.; Tees, 3 in. and larger, 1.75c.; Bulb Angles and Deck Beams, 2c. Under the Steel Bar card Angles, Channels and Tees under 3 in. are 1.70c., base, for Bessemer and Open Hearth, subject to half extras on the Standard Steel Bar card.

Sheets.—The subcommittee recently appointed by the independent Sheet mills will meet in this city January 2, at which it is expected the readjustment in prices agreed upon will be announced to the trade. It is expected that Galvanized Sheets will be reduced $4 to $5 a ton, and Black Sheets $2 or possibly $3 a ton. Nothing official has been given out and will not be until after this subcommittee meets. Regular prices on Sheets in effect at this writing are as follows: Blue Annealed Sheets, No. 10 gauge and heavier, 1.85c.; Nos. 11 and 12, 1.90c.; Nos. 13 and 14, 1.95c.; Nos. 15 and 16, 2.05c.; Box Annealed, Nos. 17 to 21, 2.35c.; Nos. 22 to 24, 2.40c.; Nos. 25 and 26, 2.45c.; No. 27, 2.50c.; No. 28, 2.60c.; No. 29, 2.75c.; No. 30, 2.85c. We quote Galvanized Sheets as follows: Nos. 10 and 11, 2.65c.; Nos. 12 and 14, 2.75c.; Nos. 15 and 16, 2.85c.; Nos. 17 to 21, 3c.; Nos. 22 and 24, 3.15c.; Nos. 25 and 26, 3.35c.; No. 27, 3.55c.; No. 28, 3.75c.; No. 29, 4c., and No. 30, 4.25c. We quote No. 2 gauge Painted Roofing Sheets at $1.85 per square, and Galvanized Roofing Sheets, No. 28 gauge, $3.25 per square, for 2-in. corrugations. These prices are subject to a rebate of 5 cents per 100 lb. to the large trade, jobbers charging the usual advances for small lots from store.

Tin Plate.—The subcommittee appointed by the Tin Plate mill to handle the matter of a readjustment in prices of Tin Plate will meet in this city January 2, after which it is likely the reduction agreed upon will be given out. This reduction is due almost entirely to the heavy decline in the price of Pig Tin in the last three months. Present quotation is $3.90 for 100 lb. Cokes, 14 x 20, f.o.b. Pittsburgh, terms 30 days, less 2 per cent. off for cash in 10 days, this price being subject to the usual rebate of 5 cents per base box in large lots.

Bars.—The situation continues very quiet, and little new business in either Iron or Steel Bars is being placed. Specifications against contracts are only fair, and do not represent more than 25 to 30 per cent. of output of the mills. Prices are still being firmly held. We quote Iron and Steel Bars on the basis of 1.60c., Pittsburgh.

Spelter.—From the low price of 4c., St. Louis, made last week, the market is a little firmer, and prime grades of Western Spelter are now held at 4.05c. and 4.10c., St. Louis, equal to 4.17½c. and 4.22½c., Pittsburgh. New buying is light, and the smelters are cutting down the output.

Hoops and Bands.—Very little new business is being placed, and specifications against contracts are only fair. We quote Steel Hoops 2c., and Bands for all purposes at 1.60c., base, half extras as per Standard Steel card. These prices are for carload lots, f.o.b. Pittsburgh, plus full tariff rail rate to point of delivery, an advance of $2 a ton being charged for less than carloads.

Spikes.—There is no improvement in the demand, and all the mills making Spikes are short of orders. We quote Railroad Spikes at $1.90 to $1.95, and smaller sizes at $2.05 to $2.10 per 100 lb., f.o.b. Pittsburgh.

Merchant Steel.—New demand is practically stagnant, and specifications against contracts are so light that the mills are all short of work, some running only half time or less. Prices are weak, except on Shafting, and we quote nominally as follows: Cold Rolled Shafting at 54 per cent. off in large lots and 48 per cent. off in carload lots, delivered in base territory; Smooth Finished Machinery Steel, 1.85c. to 2c., depending on quality; Flat Sleigh Shoe, 1.65c. to 1.75c.; Cutter Shoe, 2.15c. to 2.20c.; Toe Calk Steel, 2.10c. to 2.15c.; Railroad Spring Steel, 1.75c. to 1.80c.; Crucible Tool Steel, 6c. to 8c. for ordinary grades, and 10c. and upward for special grades.

Merchant Pipe.—Contracts have been pretty well filled, except for such tonnage as has been held up, and the Pipe mills will enter the new year with less unfilled orders on their books than for many months. In the absence of new demand, prices are being well sustained on Steel Pipe, but on Iron Pipe continue to be shaded. The net discount on Steel Pipe to the large trade on ¾ to 6 in. is 74 and 5 per cent. off list, while on Iron Pipe ¾ to 2 in., 71 and 5 per cent., and over 2 to 6 in., 70 and 5 per cent. are quoted. Discounts on Steel Pipe are as follows:

Merchant Pipe.

	Jobbers, carloads. Steel. Black.	Galv.
	%	%
⅛ to ¼ in.	65	49
⅜ in.	67	53
½ in.	69	57
¾ to 6 in.	73	63
7 to 12 in.	70	55
Extra strong, plain ends:		
⅛ to ⅜ in.	58	46
½ to 4 in.	65	53
4½ to 8 in.	61	49
Double extra strong, plain ends:		
½ to 8 in.	54	43

To the large trade all above discounts are subject to 1 point on the base, and 5 per cent. on the net.

Boiler Tubes.—The market is quiet, and prices are more or less shaded. Usual discounts on Merchant Tubes are as follows:

Boiler Tubes.

	Iron.	Steel.
1 to 1½ in.	42	47
1¾ to 2¼ in.	42	59
2½ in.	47	61
2¾ to 5 in.	52	65
6 to 13 in.	42	59

2½ in. and smaller, over 18 ft. long, 10 per cent. net extra.
2¾ in. and larger, over 22 ft. long, 10 per cent. net extra.

Iron and Steel Scrap.—Reports are current that Heavy Steel Scrap has sold under pressure as low as $11 a ton. Nominal prices, which would probably be shaded $1 a ton or more, if any business was offering, are as follows: Heavy Steel Scrap, for Pittsburgh, Steubenville or Sharon delivery, $12.50; Cast Iron Borings, $6; No. 1 Cast Scrap, $14.50; Bundled Sheet Scrap, $9; Low Phosphorus Melting Stock, $16; Rerolling Rails, $12.50; No. 1 Busheling Scrap, $12.50; No. 2, $9.50 to $10; Old Steel Rails, short pieces, for Open Hearth use, $12.50; Steel Axles, $17.50 to $18; Standard Sheet Bar Crop Ends, $15; Iron Axles, $22.50; Grate Bars, $11.50 to $12; Stove Plate, $10.50. All these prices are per gross ton, f.o.b. Pittsburgh, unless otherwise noted.

Coke.—Some Furnace Coke has been sold for delivery in first three months and first half of next year on the basis of $2.25 a ton, at oven. Connellsville Furnace Coke for prompt shipment is offered as low as $2 a ton, at oven, and there have been some sales at that price. The output of Coke continues to grow materially less, due to the blowing out of ovens, and last week the Upper and Lower Connellsville regions made less than 150,000 tons. More than two-thirds of the ovens in the Upper and Lower Connellsville regions are idle, and this number will be increased unless the demand for Coke soon improves.

The Connecticut Can Company, Hartford, Conn., has been incorporated in Connecticut to manufacture tin cans, to begin business with $2000 capital. The incorporators are Havilah A. Blakeslee, Roger H. Blakeslee and Florence C. Blakeslee. No new plant is contemplated, and the necessary machinery to begin manufacturing has been purchased. Baking powder and coffee cans will be manufactured.

Birmingham.

BIRMINGHAM, ALA., December 28, 1907.

Pig Iron.—The number of inquiries made as to requirements for the first quarter is very gratifying, but little business has resulted. Melters are manifesting more interest as to market conditions than at any time for weeks, but it seems to be generally conceded that prices will not have been established on a firm basis until the readjustment of financial and commercial affairs has been more effective. While $14 on a No. 2 Foundry basis, f.o.b. Birmingham, is quoted, it seems to be pretty well understood that this quotation is nominal, and would no doubt be shaded considerably for a round tonnage. It is problematic, to say the least, as to just what basis will have been reached when the market is again active. At any rate, there is no doubt that producers in general will be in better shape to adjust themselves to changed conditions than at any time for a decade. With the exception of the furnace operated by the Central Iron Company, at Holt, Ala., which, it is reported, will be put in blast about March 1, there are indications that the output of Merchant Pig Iron will be increased within the near future.

Cast Iron Pipe.—Notwithstanding the fact that a considerable tonnage is now being held up by reason of the unsettled condition of the Pig Iron market, producers appear to be confident of the prospect for future business, and no doubt plants now idle by reason of the holidays will be put in operation early in January. No new lettings are in sight for the immediate future, and no doubt order books for the first part of the year will consist largely of small lots. We quote, nominally, per net ton, f.o.b. cars here: 4 to 6 in., $30; 8 to 12 in., $29; over 12 in., average, $26, with $1 per ton extra for Gas Pipe.

Old Material.—No interest whatever is being manifested by consumers as to future requirements. An occasional sale of Cast Scrap at variations in price, is reported, and is the feature of the market. Some stock has accumulated on dealers' yards, but it is to be noted that only bargain lots are being purchased, and indications generally are that lower prices are being anticipated. We quote nominally as follows, per gross ton, f.o.b. cars here:

Old Iron Rails	$22.00 to $22.50
Old Iron Axles	18.50 to 19.00
Old Steel Axles	17.00 to 17.50
Old Car Wheels	20.50 to 21.00
No. 1 Railroad Wrought	17.50 to 18.00
No. 2 Railroad Wrought	13.00 to 13.50
No. 1 Country Wrought	14.50 to 15.00
No. 2 Country Wrought	12.00 to 12.50
Wrought Pipe and Flues	13.50 to 14.00
Railroad Malleable	14.00 to 14.50
No. 1 Steel	13.50 to 14.00
No. 1 Machinery Cast	12.50 to 13.00
Stove Plate and Light Cast	8.75 to 9.25
Cast Borings	7.75 to 8.25

New York.

NEW YORK, December 31, 1907.

Pig Iron.—The pressure of Southern competition is being more keenly felt in these markets, the price of $13 for No. 2 Foundry, at Birmingham, being equivalent to $17 in New York harbor. The greater number of melters must of course add inland freights. There is more inquiry, foundrymen being in some cases down pretty low. We quote, tidewater, $18.50 to $18.75 for No. 1 Northern Foundry, $17.25 to $17.75 for No. 2 Foundry and $16.75 to $17 for No. 2 Plain. Alabama Irons are quoted $18.25 to $18.50 for No. 1 Foundry, and $17.25 to $17.50 for No. 2 Foundry.

Steel Rails.—Buying is still postponed, though advices have been received from a few roads as to their expected requirements in 1908. The New Haven, for example, will want 12,000 tons, a small part of which, probably 1000 tons, will be Open Hearth Rails. This road bought 42,000 tons in 1907, but this included extraordinary requirements, due to six-tracking the Harlem Division and to trolley line mileage. An inquiry on behalf of the Havana Central is for 5000 tons or more, but is only tentative thus far.

Structural Material.—The past week has intensified the recent quietness in structural lines. A few bridge contracts have been closed, but for only small tonnages. The Baltimore & Ohio took 250 tons and the Lackawanna and Delaware & Hudson smaller amounts, from the American Bridge Company. There has also been some small business from the P. & L. E. and the Grand Trunk. At Easton, Pa., for a proposed bank building calling for a few hundred tons of Steel, bids are to go in this week. On the Eno Building, on the Fifth Avenue Hotel site, bids went in about 10 days ago, but nothing has come out as yet. From 7000 to 8000 tons will be required, according to present plans. Quite a little city work is waiting in Manhattan on the making of financial arrangements. A beginning was made this week in negotiations for an issue of bonds. A new factor appears in the Structural Steel market with the starting of the Grey mill of the Bethlehem Steel Company this month. The Grey sections have already been specified to some extent for work that is pending. We continue to quote mill shipments of Structural Shapes, f.o.b. at tidewater, as follows: Beams, Channels, Angles and Zees, 1.86c.; Tees, 1.91c. On Beams, 18 to 24 in., and Angles over 6 in., the extra is 0.10c. Material cut to length is sold from stock at 2¼c. to 2½c.

Bars.—The Eastern Bar Iron mills are gradually accumulating orders, and it is possible that some of them may have a sufficient quantity in hand to warrant resumption of operations on January 6. It is known, however, that other manufacturers will not reopen their mills until somewhat later in the month. Prices are continued at 1.60c. Pittsburgh, or 1.76c. tidewater, for either Iron or Steel Bars.

Plates.—Trade continues quiet and not much immediate business is expected in this locality. Most consumers of Plates are either doing little or have closed for the holidays.

Cast Iron Pipe.—The most cheerful reports are now coming from the South. Quite a number of fair sized lettings have recently been made by Southern cities, and more of these are expected to come out. Inquiries in that section are considerably better than some time ago. The Northern users of Pipe are not yet making inquiries for spring delivery, but it is expected that some of these may make their appearance early in January. It transpires that within the past week a contractor on city work, who was the successful bidder on a piece of Pipe construction which has been held up, placed his order for the Pipe with a local foundry and finds himself the gainer by many thousand dollars as compared with the price he would have been obliged to pay in the summer, when his contract was closed. Carload lots of 6-in. are quoted at about $28.50 per net ton at tidewater, but larger lots can of course be placed at somewhat lower figures.

Old Material.—The market has been exceedingly quiet. Possibly holders of Old Material have been pressing smaller quantities on the market than for the previous two or three weeks, as prices are beginning to show a little indication of stability. It is expected that some buying will be done by those rolling mills which are understood to be contemplating the resumption of operations early in January. Quotations per gross ton, New York City, are as follows:

Old Girder and T Rails for melting	$8.50 to $9.00
Heavy Melting Steel Scrap	8.50 to 9.00
Old Steel Rails, rerolling lengths	10.00 to 11.00
Relaying Rails	16.00 to 17.00
Old Iron Rails	14.00 to 14.50
Standard Hammered Iron Car Axles	17.00 to 18.00
Old Steel Car Axles	14.00 to 14.50
No. 1 Railroad Wrought	10.50 to 11.50
Iron Track Scrap	9.50 to 10.00
No. 1 Yard Wrought, long	10.00 to 10.50
No. 1 Yard Wrought, short	9.50 to 10.00
Light Iron	4.50 to 5.50
Cast Borings	4.50 to 5.00
Wrought Turnings	6.00 to 6.50
Wrought Pipe	8.00 to 8.50
Old Car Wheels	15.00 to 15.50
No. 1 Heavy Cast, broken up	12.00 to 12.50
Stove Plate	11.00 to 11.50
Grate Bars	8.50 to 9.00
Malleable Cast	11.00 to 11.50

Metal Market.

NEW YORK, December 31, 1907.

Pig Tin.—The Pig Tin market for the week has been just about as dull as those for the few preceding weeks. Prices have worked up a trifle, but there has been no great change. Daily fluctuations are as follows:

	Cents.
December 24	27.00
December 26	27.00
December 27	26.62½
December 30	27.37½
December 31	27.25 to 27.37½

Deliveries into consumption for the month of December will be small, totaling about 1200 tons. It is necessary to go back 10 years to find a parallel for these small deliveries. The arrivals at the Atlantic seaboard for the month of December will be 1184 tons, so that the stocks at the end of the month will be practically the same as at the end of November. There are afloat for American ports 740 tons. The London market closes a trifle firmer to-day, £123 10s. being quoted for spot, and £124 10s. for futures.

Copper.—An improvement in sentiment, both in this country and abroad, has been responsible for a further advance of prices. Actual business, however, is very small; yet there is a more hopeful feeling in the trade than for several weeks. Some Lake was sold on Saturday at 13.50c. To-day's quotations are from 13.62½c. to 13.87½c. There has been a little further inquiry for Electrolytic, and bids in the market at 13.50c. on Monday were not taken, the general asking price being 13.62½c. Casting Copper can be had at 13.25c. to 13.50c. A gradual improvement is looked for with the opening of the new year, and it would not be surprising if 14c. were paid some time during January. The industrial condition in Germany is not so bad as has been painted, and while conditions there are far from satisfactory, they are considerably better than in this country. Consumers of Copper in this country could scarcely

use less, and any change will probably be in the form of an improved demand. A rapid advance like that which took place in October would, however, be the signal for considerable unloading of metal. Exports for 30 days of the month will exceed 33,000 tons.

Spelter.—Business is dull, and quotations are slightly easier. Metal has been sold on a basis of 4.05c., St. Louis, and 4.20c., New York.

Antimony.—Prices of Antimony are largely nominal, and are believed to be more or less fictitious. Hallett's can be imported at 8.50c. and Cookson's at about 9c. There is an unusually large quantity of Antimony on the way to this country.

Pig Lead.—Again there has been a good demand for Lead, particularly on Monday of this week, when there were inquiries in the market for a large tonnage. Prompt shipments from the West were sold at 3.50c. to 3.60c., f.o.b. St. Louis, and some metal went at 3.75c., New York. The inquiry was for January, February and March, as well as for futures.

Ferroalloys.—The market for Ferromanganese would be represented at $48 to $49. These prices are considered low. Dullness prevails in the market for 50 per cent. Ferrosilicon. Domestic rules around $90, but imported is held at higher figures.

Nickel.—Prices are without change, at 45c. for large lots, and 55c. to 60c. for smaller quantities.

Tin Plates.—Some new business has developed during the week, and the market is strong, at $3.90, Pittsburgh, and $4.09, New York.

Old Metals.—There is an almost entire absence of business, and although there is no change in quotations from last week, the market is a trifle steadier.

Iron and Industrial Stocks.

NEW YORK, December 31, 1907.

The stock market naturally continues to suffer from lack of interest and transactions are light. Prices for the greater part of the period since last week's report were maintained at about the level then quoted, but on Saturday a change for the better occurred, which was due to the increasing supply of currency and more favorable reports from the banking interests. The range of prices for the week, therefore, shows a somewhat wider range than at first seemed likely from the occurrences of the previous days of the week. This range, taking in the period from Thursday of last week to Monday of this week, was as follows on the active stocks: United States Steel common 25¼ to 27¼, preferred 86⅝ to 89¼; Car and Foundry common 29¼ to 31¾, preferred 83¼ to 86; Locomotive common 34 to 36, preferred 85½ to 87; Steel Foundries common 6 to 6⅝, preferred 29 to 29½; Colorado Fuel 18¼ to 20; Pressed Steel common 18½ to 19¾, preferred 67 to 69; Railway Spring common 26, preferred 77; Republic common 15¾ to 16½, preferred 65½ to 66½; Sloss-Sheffield common 33¾ to 34; Cast Iron Pipe common 20 to 20⅝, preferred 56 to 56⅞; Can preferred 41½. Last transactions up to 1.30 p.m. to-day are reported at the following prices: United States Steel common 26⅜, preferred 88⅜; Car & Foundry common 31⅜, preferred 83¼; Locomotive common 35⅛, preferred 86½; Colorado Fuel 19½; Pressed Steel common 20, preferred 67; Railway Spring common 26⅝; Republic common 16⅜, preferred 66¼; Sloss-Sheffield common 36½; Cast Iron Pipe common 20½, preferred 58¼; Can common 4¼, preferred 41½.

Directors of the Chicago Pneumatic Tool Company deferred action December 27 on the quarterly dividend. The company has been paying 4 per cent. quarterly. President Duntley says: "We have deferred action on the dividend until we see how the year opens and what the prospects are, and to see whether general trade conditions become better or otherwise. The money has been earned, but we thought it better policy to defer the action. The company has had a prosperous year."

Dividends.—The Washburn Wire Company, Providence, R. I., has declared a quarterly dividend of 1¾ per cent. on its preferred stock.

The Nicholson File Company, Providence, R. I., has declared a quarterly dividend of 2 per cent. on its capital stock.

The American Rolling Mill Company, Middletown, Ohio, has declared the regular quarterly dividend of 1½ per cent. on the preferred stock, payable January 15.

It has been erroneously stated in press dispatches that the Iroquois Iron Company, Chicago, had passed its usual dividend, whereas it should be stated that the usual dividend has been declared and paid.

The American Rolling Mill Company, Middletown, Ohio, has declared a quarterly dividend of 1½ per cent. on its preferred stock.

The Tennessee Coal, Iron & Railroad Company's Sales Department.

General office, Woodward Building, Birmingham, Ala. Frank A. Burr, general manager of sales; Willard Wilson, assistant general manager of sales; F. A. Dilworth, assistant general manager of sales.

Offices for the sale of all products other than coal and coke are as follows:

Pittsburgh, Pa., Carnegie Building. A. M. Harper, manager of sales; Frank E. Spencer, assistant manager of sales.

New York, Empire Building, 71 Broadway. Charles W. Baker, manager of sales; Charles C. Cluff, assistant manager of sales.

Philadelphia, Pa., Pennsylvania Building. James B. Bonner, manager of sales.

Cleveland, Ohio., 1610 Rockefeller Building. John R. Scott, manager of sales; R. S. Le Barre, assistant manager of sales.

Chicago, Ill., Commercial National Bank Building. George Baker, manager of sales; W. J. Totten, assistant manager of sales.

Cincinnati, Ohio, Union Trust Building. John E. Woods, manager of sales.

St. Louis, Mo., Chemical Building. Wm. B. Weston, manager of sales; Stillman W. Wheelock, assistant manager of sales.

Detroit, Mich., Union Trust Building. N. D. Carpenter, manager of sales; W. C. Bogue, assistant manager of sales.

Buffalo, N. Y., 203 Ellicott square. T. Guilford Smith, manager of sales; Fred C. Deming, assistant manager of sales.

Boston, Mass., 125 Milk street. Wilbur Sargent Locke, manager of sales; Wm. Fred Hickey, assistant manager of sales.

St. Paul, Minn., Pioneer Press Building. George Allen McDougall, manager of sales; Edwin S. Mills, assistant manager of sales.

Portland, Ore., Wells Fargo Building. R. R. Hoge, manager of sales.

San Francisco, Cal., Crocker Building. Richard B. Carr, manager of sales.

Denver, Colo., 222 Equitable Building, Edw. M. Sparhawk, manager of sales. New Orleans, La., 916 Hennen Building, James R. Mills, Jr., manager of sales.

Offices for the sale of coal and coke are as follows:

Birmingham, Ala., Woodward Building, J. W. Whatley, manager of sales.

New Orleans, La., 325 Carondelet street, Frank S. Walshe, manager of sales.

Export business for all products: United States Steel Products Export Company, 21 State street, New York.

The Reading Iron Company, Reading, Pa., has issued the sixth edition of its pamphlet, entitled "Wrought Iron Pipe Versus Steel Pipe," from which considerable extracts were given in *The Iron Age* of August 2, 1906, page 277. This last edition gives additional testimony from users of wrought iron pipe. In reference to galvanized pipe the introduction to the last pamphlet calls attention to the fact that owing to the roughness of its surface wrought iron requires more zinc for galvanizing than steel.

In the past week some readjustments of wages have been made at Alabama blast furnaces, where labor has been abnormally high for two years, with the maintenance for most of that time of a scale of pig iron prices very much above the market to-day.

The Lackawanna Steel Company will start up its No. 2 blooming mill at South Buffalo, N. Y., on Monday, January 6, and on January 13 the plate mill will resume in view of accumulated plate orders.

The plant of the Washington Tin Plate Company, Washington, Pa., which has been closed for repairs, will start again on January 6.

The Machinery Trade.

Prospects for the New Year.

NEW YORK, December 31, 1907.

In the midst of great prosperity in every branch of trade, the year 1907 opened with the best of conditions prevailing, and with every indication of a continuance of the large demand then existing for machinery of almost every description. For the two years previous there had been a steady and healthy growth of trade, due to the continued expansion of enterprises using metal working machinery, to cope with which machinery manufacturers also largely increased their facilities; but even with the greater output they were wholly unable to supply the demand which was steadily increasing at the beginning of the past year. Consequently shops became congested with work and delivery dates were extended months ahead. Manufacturers sought every possible way to increase production, but, do what they could, business came in faster than they could take care of it. Practically all makes of tools became scarce, and so pressing was the demand that many new companies were formed and new plants erected; but even with the greater number of works the supply did not equal the demand, and so eager were buyers to secure machines that thy made large purchases of second-hand machinery to tide them over until they could get new tools. Prices were good, and within the first few months they were advanced another 10 per cent., so that the business received was very profitable. This exceptionally heavy demand for machinery was the result of the continued expansion of trade throughout the country, no one class contributing a conspicuously large proportion, though three branches of industry developed to an extent worthy of note. Of these the most important were the railroads. The large systems greatly augmented their rolling stock and extensively increased their shop facilities by both the erection of new buildings and the purchase of new equipment. It is believed that during no similar period in recent years did the railroads buy so heavily and issue so many large lists of machine tools as they did during the first seven months of 1907. The steel companies were large purchasers of machinery, as were also the cement manufacturers. The use of cement in the construction of buildings had bcome so general that a great many new beds were developed and plants installed. In March came the first indication that a recession of business could be looked for. During that month there was a slump in the stock market, which indicated a downward trend, though the demand for machinery held up surprisingly well at the time, and it was not until August that business began to fall off to any considerable extent. Then the volume of transactions became noticeably smaller, plans for new plants and extensions diminished in number and importance, and the railroads began to retrench. Then followed the collapse of the copper market. Although trade fell off badly shops were full of work, with fair prospects; but in October came the money panic, which caused the peculiar situation of works with plenty of orders on hand having to close down or reduce forces because they could not get money to carry on their business. Several important companies became financially embarrassed and were placed in the hands of receivers. The financial disturbance also caused the sudden stoppage of new enterprises, and a large number of cancellations of orders for machinery were received by manufacturers. Deliveries soon became normal. In spite of the fact that during the last three months business was rather light, machinery houses had a prosperous year.

The present demand for machinery is rather light, but this is not unnatural for the time of the year and does not indicate a change from a normal volume of business. At the opening of the new year trade has an upward tendency, general conditions appear to be good, the financial situation is clearing up and what is considered a healthy sign—the general disposition is to maintain prices. There is a wide difference of opinion among machinery men, however, as to the outlook for the immediate future, many believing that by spring money will be easier, confidence will be restored and a more active demand will follow. The basis for this opinion, the entire clearing up of the financial atmosphere, will undoubtedly play an important part in the trend of business next year, as many projects are being held in abeyance because of the inability to secure the necessary funds to carry them to completion. The railroads have been affected more than any other industry by the scarcity of money, and they will probably be among the first to re-enter the market, as many of them are in need of additional equipment. It has been pointed out that the railroads have largely increased their rolling stock the past two years, but their shop facilities have not been proportionately enlarged. The heavier locomotives which were purchased have been in service a year or more and now need repairs. It is understood that many roads are in the same predicament as the large system which was forced to come into the market last month for a round lot of machine tools for making repairs to heavy equipment. The worst feature of the present situation is the uncertainty with which the future is viewed by a great proportion of users of metal working machinery. With few exceptions the railroads are planning no extensive improvements for this year, and intend to confine their energies principally to the completion of work under way. A majority of the large systems report that any large or extensive work will be contingent upon better conditions than prevail at the present time. Plans have been prepared, however, for enlargement of mechanical facilities by several roads, and it is believed that these will be carried through this year. Many industrial companies, which have plans for extensions to their plants state that they will not start work of construction until business materially improves. The important inquiries that came before the trade the past two weeks restored confidence to a considerable degree, and these with the tendency of the larger interests to enter the market indicate a more active demand early in the year.

Trade Associations.

Trade associations were particularly active during the last year, and the various conventions, especially the spring and fall meetings of the National Machine Tool Builders' Association, were marked by large attendances. At the session of this organization and at the annual meeting of the Leather Belting Manufacturers' Association, it was decided to make no changes in prices during the coming year, and the indications are that this course will be strictly adhered to. One of the most important developments at any of the conventions was the decision of the National Machine Tool Builders' Association to consider at the next meeting a form of selling agreement betweeen manufacturers and dealers. The United Gas Engine Builders, an organization to further the interests of builders of gas engines, was formed during the summer, and manufacturers of Corliss engines and automatic high speed engines held conferences during the year with a view to furthering their interests. A similar session was held between manufacturers of pneumatic stone tools. The decision of the American Supply & Machinery Manufacturers' Association, the National Supply & Machinery Dealers' Association and the Southern Supply & Machinery Dealers' Association to meet in joint session at Richmond, Va., on May 14, 15 and 16, 1908, will no doubt result in a closer friendship between manufacturers and dealers.

The movement to form a Machinery Club in New York developed during the year into a marked success, and within six months the organization expects to be installed in its quarters in the Hudson Terminal Building. The club now has about 500 members, which include prominent people in the trade from all parts of the country.

Prospective Machinery Requirements of the Railroads.

The amount of construction work carried over and that thus far planned for the new year can be readily found by glancing backward at the more important projects that have come to the general notice of the trade.

From the viewpoint of purchases of machinery, the New York Central Railroad will probably be of considerable importance to the trade if the officials decide to carry out the plans formulated by the motive power department. This road is in need of a large amount of mechanical equipment to take care of its heavy rolling stock, and only last month was forced to come into the market for about $75,000 worth of machinery. The purchases made at that time are understood to be the beginning of a buying movement that will extend over a considerable period and cover a large amount of equipment. It is understood from a reliable source that the motive power department has asked for between $2,000,000 and $3,000,000 for the purchase of machinery next year, and it is likely that even if the whole amount is not appropriated the officials will decide upon the expenditure of a considerable sum of money. It is understood that the company has in course of preparation a small list of tools for its shops at West Albany, N. Y.

One of the first roads to place orders for machinery this year will be the New York, New Haven & Hartford Railroad, which only two weeks ago issued a list covering 24 machine tools, the orders for which will undoubtedly be placed within a very short time. This road has in contemplation building operations which will entail the expenditure of a large sum of money for mechanical equipment, and which are likely to be carried out as soon as business conditions justify. Only last year the company equipped its large shops at Readville, Mass., to take care of repairs at the eastern end of its system, and is in need of shops at the western end of the system. This matter has been talked over, but no definite plans have been prepared, nor has the site been announced, but it is generally understood that the shops are to be erected at New Haven.

In connection with the operations of the New York, New

Haven & Hartford Railroad, the plans of the New York, Westchester & Boston Railroad and the New York, Port Chester & Boston Railroad are of considerable interest, as the former railroad has secured control of the two latter and will undoubtedly take up the construction of these roads, which has been held in abeyance the past year, as the franchises are considered valuable. These two trolley roads, which were combined some time ago, had plans prepared for the erection of a power plant of about 15,000 kw. capacity, and repair shops near Mt. Vernon, N. Y., and had issued a list of its machinery requirements. The construction of the road and purchase of equipment were delayed by money stringency, and it will not be surprising to see these taken up again as soon as the New Haven Railroad considers the time propitious.

The main construction work to be undertaken this year by the Delaware, Lackawanna & Western Railroad will be the completion of its extensive shops at Scranton, Pa., the building of which was started last year and part of the equipment purchased. This plant is to comprise a group of large buildings, the estimated cost of which, complete with tools and machinery, is about $2,500,000. The construction work on several buildings is well under way, and during this year the company will complete these and begin the erection of a main machine shop about 346 x 582 ft.; power house, 90 x 160 ft.; store house and several other buildings, for the equipment of which a large amount of machinery will be purchased. In addition to these, the plant when completed will include a foundry, 120 x 400 ft.; blacksmith shop, 120 x 300 ft., paint shop, 90 x 162 ft., &c.

The destruction by fire in December of the repair shops of the Boston & Maine Railroad at East Cambridge, Mass., will undoubtedly hasten plans for the proposed new shops to be erected in Summerville, just outside of Boston. While plans for the new shops have not been entirely completed, they are well under way, and work of constructing the buildings will be commenced this year. As a result of the loss by fire of its East Cambridge shops, the repair facilities of the road, at no time during the past year adequate, are still further restricted, and the road will likely come into the market early in the year for new machinery.

The Central of Georgia Railroad has had plans under way for some time for the construction of new shops at Macon, Ga., and early last year some of the power equipment for these shops was purchased and the ground prepared for the construction of the buildings. While plans for the new buildings have not been made public, the size of the undertaking is indicated by the fact that about $1,000,000 is to be expended for the shops and equipment. As soon as the road decides to go ahead with the construction of the shops it will undoubtedly come into the market for a large number of machine tools.

During the past year the Grand Trunk Pacific Railroad, Montreal, Canada, made practically no progress toward the construction of its new shops, to be erected at Edmonton, where an extensive site has been secured. The construction of these shops depends upon the progress made in the building of the road, and it may be some little time before the company will be in a position to take up the matter of equipment.

Quite a large sum of money is to be spent by the Kansas City, Mexico & Orient Railroad in the construction of new shops at Wichita, plans for which are being prepared by Westinghouse, Church, Kerr & Co., New York.

The Atlanta, Birmingham & Atlantic Railroad, Atlanta, Ga., is completing the construction of its road from that city to Birmingham, Ala., and intends to complete the work outlined in its original plans, but does not intend to undertake any new work of importance this year. The plans as laid down some time ago contemplate the erection of shops, yards and freight and passenger stations on a site at Atlanta, which was secured some time ago.

The Tidewater Railroad, owned by the Virginia Railroad Company, Norfolk, Va., contemplates the erection of new shops, but has not yet fully developed plans.

The Idaho & Washington Northern Railroad, Cœur d'Alene, Idaho, intends to build shops and a round house at Spirit Lake to cost about $100,000. Plans for the buildings have not yet been completed, but it is the intention of the company to erect the shops this year.

The Missouri, Kansas & Texas Railroad has under concideration the erection of extensive additions to its shops at Smithville, Texas, plans for which have not been definitely decided upon.

The New York & Queens County Railroad, Long Island City, N. Y., purchased about four acres of ground on the Flushing meadows about three months ago, to be used as a site for a large car house and shops.

The Atchison, Topeka & Santa Fé Railway is to make improvements to its shops at San Bernardino, Cal., including the erection of an addition to the machine shop, 100 x 500 ft., and the enlargement of the round house.

New Industrial Plants and Additions.

Of the construction of new industrial plants and additions a great deal of work has been outlined, the carrying out of which depends upon business conditions this year. The principal obstacle has been the money stringency, which seems to be becoming easier, and indications are that a large part of this work will be undertaken provided no further depression occurs. During the past year a large amount of business was received by machinery houses from the steel companies which expanded materially, the largest purchaser being the United States Steel Corporation, which has plans prepared for work that will necessitate the purchase of a great deal of additional equipment. The principal work of the corporation which has engaged the attention of the trade is the construction of a new plant at Gary, Ind., by its subsidiary, the Indiana Steel Company. Another important project of the corporation is the proposed new plant of the Minnesota Steel Works, to be constructed at Duluth, Minn.

A project which is engaging the attention of the trade, possibly more than any other industrial enterprise, is that of the Standard Oil Company, which has started work on the construction of a plant at Bayway, N. J., for which a large amount of mechanical equipment will be required. This company issued a list of about 20 machine tools for this plant three weeks ago. The preliminary plans for the undertaking call for the erection of a machine shop about 100 x 200 ft.; woodworking building, 150 x 300 ft.; foundry, 50 x 100 ft.; forge shop, 75 x 100 ft.; power house, 100 x 200 ft.; a large refinery and the other necessary buildings. In addition the company is to do considerable construction work at Oil City, Pa., through its subsidiary, the National Transit Company, at an expenditure of $250,000 for buildings and equipment. These will include an addition to the machine shop about 130 x 200 ft., and the erection of a new foundry, 70 x 100 ft.

The American Car & Foundry Company, St. Louis, Mo., purchased 170 acres of land at Gary, Ind., last spring as a site for a new steel car plant. The plans for the buildings have not yet been completed, and the construction of the plant will depend upon the condition of business this year.

The American Locomotive Company intends to still further increase the capacity and efficiency of its plants at Schenectady and Dunkirk, N. Y.; Richmond, Va., and Montreal, Canada. For this year the company has set aside an extraordinary addition and betterment fund of $2,000,000.

The Chicago Pneumatic Tool Company has plans for increasing the capacity and rearranging its air compressor works at Franklin, Pa., to carry out which it purchased early last year the Grant Tool Works. This latter property consists of a main machine shop, 150 x 300 ft.; machine shop, 150 x 200 ft.; power plant, pattern shop and other smaller buildings. It is the intention to equip these buildings with the most modern machinery for the manufacture of air compressors as soon as business conditions shall warrant.

Plans are being developed by the General Electric Company, Schenectady, N. Y., for the utilization of the large site it purchased at Erie, Pa., as a location for a new plant. At the present time the company is making considerable additions to its lamp factories at Harrison and Newark, N. J.

The Heine Safety Boiler Company, St. Louis, Mo., which purchased a site of 6½ acres last August as a location for its proposed new plant, has postponed the construction of the plant until spring. It is the intention to erect a plant on the property at a cost of about $300,000, for which it will require a complete equipment as soon as plans have been fully developed.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, it is understood, has not yet purchased the 20 electric cranes, bids on which it asked in November. Two of these cranes are to be of 100 tons capacity, and are to be used for the 300-ton mixers which were recently installed in its plant. The other cranes are to be installed in the company's new tube mills.

The A. P. Smith Mfg. Company, Newark, N. J., expects to take up this year the matter of equipping its new plant which is to be erected at East Orange, N. J. The plant, which will be equipped for the manufacturing of tapping machines, valves and general supplies for water works, will include a building 50 x 215 ft. for foundry, storage and office; casting, storage and cleaning building, 50 x 100 ft., and a one-story machine shop of steel construction, 100 x 155 ft.

Considerable machinery will probably be purchased within the next few months by the South Atlantic Car & Mfg. Company, Waycross, Ga., which is to rebuild its plant which was recently destroyed by fire, the new works to include an assembling shed about 20 x 500 ft.; foundry, 100 x 200 ft.; paint shop, 50 x 300 ft.; woodworking shop, 100 x 280 ft., and other buildings.

The Oscar Barnett Foundry Company, Newark, N. J., contemplates the erection of a new plant, plans for which have not been fully perfected.

Complete mechanical equipment for boiler, machine and smithshop will be required by the International Engineering Company, Box 33, Scranton, Pa., for a modern plant which it intends to erect for the manufacturing of steam boilers and engines. The company's mechanical engineer is now working on plans and specifications which will be finished within a short time. H. S. Jeffrey is president.

The J. H. Ladew Company, Newark, N. J., has purchased a site of 20 acres on the Newark meadows upon which it intends to erect a large plant. Plans for the buildings are being prepared by Harvey Murdock, 116 Nassau street, New York.

The Midland Bridge Company, Kansas City, Mo., has purchased property in Rosedale, where it intends to build a bridge shop of moderate capacity.

The Rivetless Chain & Engineering Company, Lebanon, Pa., which is building a new plant, consisting of a machine shop, 60 x 94 ft.; drop forge shop, 50 x 128 ft., and power house, 50 x 56 ft., intends to erect additional buildings in the spring.

The Andes Smokeless Fuel Company, Pittsburgh, Pa., which was recently organized with a capital stock of $100,000 by T. Moran, Ferguson Building, and associates, will erect a new plant in the spring for the manufacture of artificial smokeless fuel, and at that time will be in the market for boilers, engines, grinding, crushing and conveying machinery and other equipment.

The Harlan & Hollingsworth Corporation, Wilmington, Del., contemplates enlarging its plant by the erection of three additional buildings.

The American Electrical Heater Company, Detroit, Mich., has purchased property, fronting 156 ft. on Cass street and 290 ft. on Vienna street, upon which it intends to erect a plant in the spring to cost about $50,000. The company manufactures electrical heating appliances.

Charles H. Birmingham, Baltimore, Md., has purchased about 6 acres of land at the junction of the Baltimore & Ohio and Pennsylvania railroads, where he will establish a brass foundry, wire mill, rolling mill and metal testing plant. Plans for the buildings have not been fully perfected.

The Luitwieler Pumping Engine Company, Los Angeles, Cal., intends to erect a plant in the East to take care of its growing business. The site has not yet been selected.

Plans have been prepared by the Coatesville Boiler Works, Coatesville, Pa., for the erection of a new plant to consist of a foundry and machine shop about 60 x 120 ft. each, for the manufacture of boiler fronts, grate bars and castings of a cognate nature.

The new chain works of the Pittsburgh Chain & Forge Company at Paden City, W. Va., 30 miles below Wheeling, W. Va., is expected to be placed in operation this month. Later the company intends to erect a building about 75 x 300 ft., in which a general line of drop forgings will be made, and which will be equipped with steam hammers and other modern machinery.

Edwin S. Cramp and others of Philadelphia contemplate the establishment of a large shipbuilding plant at Norfolk, Va., where they have secured 26 acres of ground with 1000 ft. of water front.

At its annual meeting in February the Hamilton Watch Company, Lancaster, Pa., will vote upon an increase in the capital stock from $500,000 to $1,000,000, the additional capital to be used for extending the business. The company has not yet decided upon the amount and character of new machinery it will require for increasing its output, but the machinery to be added will be of the same class as that now installed.

The Calumet Iron Works, Newark, N. J., which has taken over the partially equipped plant of Charles V. Hesselbach, will be in the market in the near future for drill presses, cold saws, blacksmith forges and other machinery for the manufacture of structural steel and ornamental ironwork.

The Pittsburgh Emery Wheel Company, Pittsburgh, Pa., which is building a new plant for the manufacture of emery wheels, intends to erect a machine shop for the manufacture of grinding and polishing machinery of new design as soon as it gets its emery wheel plant in operation.

Among the large orders to be placed during the year will probably be that of the Hudson Companies, New York, for $50,000 worth of air compressors, bids for which were received last fall. This company is also expected to come into the market for considerable machine tool equipment for a new shop to be erected at the Hoboken terminal.

The American Electrical Novelty & Mfg. Company, New York, has purchased 115 acres of ground in South Elizabeth, N. J., where it intends to erect a plant for the manufacture of electrical novelties.

Jabez Burns & Sons, New York, manufacturers of coffee and spice machinery, intend to move their plant to Jersey City, N. J., where they are to erect a new building, 150 x 275 ft. As soon as the building is completed the company will probably come into the market for turret lathes, radial drills, a boring mill, presses and punches.

The Buffalo Foundry & Machine Company, Buffalo, N. Y., which recently took over the Buffalo Foundry Company and the David Bell Engineering Works, has not yet purchased the equipment for the new machine shop it intends to erect 160 ft. long with a main bay, 64 ft. wide and a side bay 30 ft. wide.

The H. G. Kotten Company, New York, has purchased ground at Marion, N. J., 150 x 250 ft., upon which it will erect a plant, 75 x 150 ft., for the manufacture of pneumatic tools. The present equipment will be moved into the new building, and in addition considerable new equipment will probably be installed, including a producer gas plant of about 75 hp.

The American Wheel & Vehicle Company, Penobscot Building, Detroit, Mich., has purchased a site for a new plant, the main building to be 157 x 200 ft. This will be equipped with wood and ironworking machinery, which will be driven by independent motors. The company will manufacture principally the Jeffrey patent wheel.

The Three Forks Portland Cement Company, Three Forks, Mont., contemplates the establishment of a cement plant, plans for which are being prepared by L. G. Smidth & Co., New York.

Power and Tunnel Work.

While a great deal of business resulted from large power projects during the year just ended, many of them, which it was anticipated would mature toward the end of the year, were postponed chiefly because of the financial situation, and in consequence it is expected that they will develop during the present year. In addition to the projects, which for one reason or another did not materialize in business, there have come to life during the last few months a number of new propositions which will result in some large purchasing. Noticeable among these is the plant of the Juneau Water, Light & Power Company, 42 Broadway, New York, which is planning to erect a hydraulic plant of about 40,000 hp. at a point which has not yet been made public. This company has been capitalized for about $4,000,000, which it is expected will cover the cost of the erection of the plant.

Considerable buying will be done during the year by J. G. White & Co., 49 Exchange place, New York, for the railroads which the company is constructing on the islands of Negros, Cebu and Panay, in the Philippines, where it is expected some large car repair plants will be equipped. Altogether about $30,000,000 is being spent on these islands by this company. There will be a large list of machine tool requirements for this project. The J. G. White Co. also has under way the construction of a large dam nine miles west of Denver, Colo., at a cost of $4,000,000, for which considerable equipment will be required. Another extensive railroad project which is being undertaken by the company is the construction of a number of railroad lines for the Bolivian Government, and the project is being financed by Speyer & Co., New York. It is anticipated that $26,000,000 will be spent on this project.

The Southern Power Company, Charlotte, S. C., has announced its intention of constructing a steam plant of about 50,000 hp. at a cost of $2,000,000. This plant is intended to augment the company's water power electric plants during the period of low water, and it is stated that construction work on the first section will be begun early this year. Turbines of 10,000 hp. will be used. The company now has under construction two water power plants to furnish 60,000 hp., and W. S. Lee, Jr., chief engineer, has in preparation plans which with a completed plant of about 40,000 hp. will provide the company with about 200,000 hp.

It is possible that during the year the New York Edison Company will carry out its plan to erect a power house at 120th street and the Harlem River which, it will be remembered, was postponed some months ago because of the existing financial conditions. The company has made no announcement as yet as to the size of the proposed plant, and the only information the trade has had on the subject which would indicate how large it was contemplated to make the plant is contained in the fact that about 12,000 tons of structural steel will be required if the company's plans are carried out.

One of the big power propositions on which purchasing was postponed toward the end of the year was that of the Duquesne Light Company, Pittsburgh, Pa., of which Robert C. Hall is one of the principal stockholders. This company had arranged to build a power plant on the Monongahela River at a cost of $1,500,000, and it is thought probable that the matter will develop during the present year.

The Birmingham Railway, Light & Power Company, Birmingham, Ala., contemplates the construction of a power plant to be located near the company's coal fields. An issue of $25,000,000 of bonds has been authorized, of which $15,000,000 is to be used for improvements to extend over a period of 15 years, and work on the power plant in question will mark the beginning of these expenditures.

The Great Western Power Company, of which Edwin Hawley, 25 Broad street, is president, will purchase a large amount of equipment during the year for a hydro-electric plant at Feather River, Cal., which will eventually develop 420,000 hp. The first installation is to be of about 60,000 hp. and several years will be required to complete the work. The company is capitalized for $25,000,000.

The York Haven Water & Power Company, York Haven, Pa., will double its plant during the year, according to an announcement recently made by the company, and this will result in the installation of about 10,000 additional horsepower normal capacity, with an overload equivalent to 15,000 hp. The company at present maintains a plant on the Susquehanna River, and its present 10,000 hp. has been contracted for.

It is expected that the first installation of the plant of the Long Acre Electric Light & Power Company, 74 Broadway, New York, which is to be built at 120th street and the East River, will be completed during the year. This company expects eventually to develop about 100,000 hp., and plans include a transformer station at Forty-second street and the East River. The American & British Mfg. Company, Providence, R. I., has the general contract for equipping the plant.

The Raystown Water Power Company, Huntingdon, Pa., has plans under way for the erection of a large dam and power house on the Raystown branch of the Juniata River, about six miles from Huntingdon. The company also proposes to erect a steam plant nearby to furnish auxiliary power, and altogether about 3500 hp. will be developed. It is stated that construction work will be begun this year, and the mechanical equipment has not been arranged for yet.

The Albany Power & Mfg. Company, Albany, Ga., expects to build a hydraulic power plant at Porter Shoals, near Albany, to develop about 10,000 hp. J. E. Sirrine of Greenville, S. C., is the company's chief engineer, and he will probably superintend the purchasing.

Plans are now being prepared by Frank W. Moore, Box 557, Indiana, Pa., for a plant to be erected by the Morrison's Cove Electric Light & Power Company, Royer, Pa., at a cost of $45,000. This plant will furnish light and power in the vicinity of Hartinsburg, Williamsburg and Royer, Pa.

The Public Service Corporation of New Jersey will build an extension to its power plant at Morristown, N. J., at a cost of $150,000, some of the requirements for which have been arranged for.

Plans are now being prepared by the Alpha Portland Cement Company, Easton, Pa., for a large power plant to be erected at the company's works at Martin's Creek, Pa. The size of the plant has not been announced as yet.

It is expected that during the year the United Railways & Electric Company of Baltimore, Md., will replace its Falls Road station, which was destroyed by fire several weeks ago. Plans are now under way for the proposed structure.

The Bridgewater Mfg. Company, Bridgewater, Pa., will come into the market in the spring for equipment for a power plant of about 500 hp. and a large dam the company proposes to build.

The Public Service Commission of the City of New York has decided to proceed with the arrangements for constructing an extensive subway system on Fourth avenue, Brooklyn, N. Y., at a cost of about $23,000,000. This work is expected to take about five years.

The Boston, Cape Cod & New York Canal Company expects to proceed with its plan to construct a new water way to connect Buzzards Bay, at the mouth of the Monument River, and Barnstable Bay, through the township of Bourne, Sandwich. William Barclay Parsons, 60 Wall street, is chief engineer. This project will result in the shortening of the route between New York and New England ports by 74 miles as compared with the route through Vineyard Haven.

It is expected that during the spring the Board of Water Supply, New York, will let some extensive contracts for work to be done at the city reservoirs, which will include the building of a large dam in Westchester County, extensive additions to the headwork of the Catskill aqueduct and the building of some high pressure tubes in the Rondout and Walkill divisions.

It is stated that for the Erie Barge Canal, which resulted in considerable buying the last year, several new important construction contracts will be placed the coming year.

Foreign Projects.

Foreign trade was particularly good toward the latter end of last year, and especially in some lines new fields were developed by many manufacturers. It was noticed, particularly, that trade with Mexico, Canada and South America was particularly good toward the latter end of the year, and inquiries now before the trade indicate that some big buying will be done from those countries. The Japanese Government was a large purchaser, and a great deal of business was placed by the Japanese export houses for private interests.

One of the largest foreign enterprises to develop during the year is that of the Tata Iron & Steel Company, Ltd., Bombay, India, to erect a big plant and develop ore properties in India. Charles Page Perin, 2 Rector street, New York, is the company's consulting engineer, and plans are being prepared under his supervision for the erection of two blast furnaces of about 200 tons capacity each, several 40-ton basic open hearth furnaces, a blooming mill, rail mill, beam mill, three merchant bar mills, &c. The Julian Kennedy-Sahlin Company, Ltd., London, England, has been engaged as engineer on the work.

It is expected that some large purchases will be made during the year for the Manchurian Railway, which is being constructed by the Japanese Government at a cost of $10,000,000, and it is believed in the trade that some inquiries now out include equipment for that project.

Another Japanese project which will result in some large purchases is that of the Yoshinotani Mining Company, which controls the Karatsu Iron Works of Tokio, Japan, to spend about $500,000 in the construction of a power plant, machine shop, boiler shop and foundry which will be maintained as a repair and manufacturing plant. Toshisuke Takeo, who is making his headquarters at the office of the General Engineering Company, 90 West street, New York, is the consulting engineer, and he expects to make the purchases in this country.

The Imperial Steel & Wire Company, Temple Building, Toronto, Ont., will, it is expected, complete the erection of works at Fort William, Canada, for the manufacture of wire fencing, wire staples and other wire products. This plant will employ about 200 hands.

The Michoacan Power Company of Mexico City, Mexico, which is closely connected with the Guanajuato Power & Electric Company, 25 Broad street, New York, has obtained concessions from the Mexico Federal Government for the construction of two hydro-electric power plants on the Angulo River, Mexico. One of the plants is to be of 8000 hp. and the other of about 4000 hp. Some inquiries for this enterprise have been placed in the trade, and the purchasing will be done from Mexico.

The Spanish-American Iron Company, 171 Broadway, New York, will probably have some purchasing to make for its enterprise at Mayari Incline, Cuba, where the company is spending about $5,000,000 in the development of valuable ore properties and for which a large amount of buying was done during the last few months.

Catalogues Wanted.—The A. A. B. A. Equipping Service, Missouri Trust Building, St. Louis, Mo., desires to receive catalogues of machinery, supplies and material for its files to assist it in purchasing for the manufacturers whom it represents.

Philadelphia Machinery Market.

PHILADELPHIA, PA., December 30, 1907.

Not a great volume of business is usually looked for in the closing week of the year, and the market for tools and equipment has been dull and featureless. Some few inquiries have come out, but they have been mainly single tool propositions, and were hardly expected to develop into orders until after the turn of the year. It is customary for many of the industrial plants to close down during the holidays for annual repairs and stock taking, and quite a few will most likely not fully resume until the general situation shows signs of improvement. Plants will be put in order, however, and will be in readiness for operation at short notice. After the turn of the year, when balance sheets have been gone over, buyers will be in a better position to take up the matter of making purchases of new equipment, and while it is expected that some fair business will develop, it is also believed that the buying will generally be on a conservative basis. What the new year will bring forth in the way of new propositions is problematical. General business is expected to improve materially early in the year, and a great deal depends on how extensive this business will be. The financial situation continues to improve, but must show a much more satisfactory condition before orders of any importance can be expected.

There has been a little more inquiry recently on the part of the railroads. The Pennsylvania is in the market for a few tools, orders for which will likely be placed before long, while scattered orders for special tools have been received from several of the Southern railroads. Until financial matters improve, however, the railroads can scarcely be expected to come into the market as large buyers.

Manufacturers of machine tools have a varied amount of work on their books. Some are covered to a certain extent, for their production for several months, while others are hardly so well fixed. Business continues to come in rather intermittently, and many plants must depend on day to day orders to keep them going. Moderate stocks of tools are being made, but there is little likelihood of manufacturers overstocking at the present cost of materials and labor. Curtailments continue, and unless there is a material improvement in the demand early in the year several of the larger industrial plants in this territory will further reduce their working hours.

Dealers have a better supply of tools and machinery on their floors and in warehouses than at any previous time in the year, and practically all the medium and smaller classes of tools can be had for spot delivery, while the heavier tools can also be had on very short notices, in some cases only long enough for manufacturers to assemble parts.

The demand for export is quiet. Practically nothing has developed in the way of inquiries for the standard lines of machine tools, while the demand for special tools and power transmission equipment shows but little improvement.

Inactive conditions continue in the second-hand machinery market. What business comes out is largely of a pick-up character, and confined to tools of the smaller class.

There has been an improved inquiry for castings, but actual orders are still rather light, and both iron and steel foundries are operating on restricted tonnages under which conditions they will no doubt continue until conditions improve.

Contracts of particular interest were awarded by the Philadelphia & Reading Railroad and the city of Philadelphia, jointly, during the week, for a portion of the work on the elevation of the surface tracks of the railroad along Ninth street in this city, at a cost of $1,130,000. The contracts provide for construction in connection with the elevated tracks beween Berks and Broad streets, and freight and engine yards, as per the following:

No. 5. Masonry work between Berks street and Susquehanna avenue; Armstrong & Latta, $368,790.
No. 7. Masonry work between Susquehanna avenue and Broad street; James McGraw, $276,718.
No. 8. Bridges between Berks and Broad streets; McClintic-Marshall Construction Company, $336,785.
No. 14. Freight yard between York and Cumberland streets; Armstrong & Latta, $100,718.
No. 26. Temporary engine yard at Wayne Junction; Armstrong & Latta, $47,200.

Work will be started as soon as practicable and rushed to completion. The city began several weeks ago on a large amount of sewer work, change of street grades, &c., in connection with the removal of the surface tracks, some of which is already well under way. Engineers for the railroad company and the city are now engaged in preparing plans for the next section of the elevated work, which will include that portion between Broad street and Wayne Junction.

To prevent the pollution of Maurice River, in south New Jersey, the City Council of Millville, N. J., decided at a recent meeting to install a plant for the disposal of sewage. A resolution was adopted, it is understood, to secure the services of an engineer to prepare the necessary plans and specifications for a plant to cost about $25,000.

The South Bethlehem & Saucon Street Railway Company, South Bethlehem, Pa., will extend its line to Colesville, a distance of 8 miles, and has in view a further extension from that place to Centre Valley, where it would connect with the Philadelphia division of the Lehigh Valley Traction Company.

Chicago Machinery Market.

CHICAGO, ILL., December 30, 1907.

Opening upon an era of widespread industrial expansion; experiencing reverses due to a financial upheaval; and closing with a movement of universal retrenchment, 1907 will be recorded as an epochal period in the machinery trade. The annals of former years afford no parallel to the heavy demand with which the year began. The rapid extension of manufacturing industries called for new equipment which overreached the capacity of machinery making plants to supply. By reason of the conjestion which ensued factories fell farther and farther behind with deliveries until by midyear shipments were generally weeks and months delayed. In no line of machinery did the tide of business reach a greater hight than in machine tools. Orders were taken by some manufacturers in January on which no earlier delivery than June of the following year was promised. These of course represented the extremes of overcrowding, but few factories were able to execute orders placed at that time within six to eight months from date of order. In gauging the enormous volume of business required to produce this result it must be borne in mind that, under the prosperous conditions of recent years, the productive capacity of machinery plants had been largely increased, so that it was fully abreast of normal requirements. Even before the effects of a tightening money market began to be seriously felt it became evident that the inability of producers to meet the growing demand was of itself operating to restrict the placing of orders. Extravagant premiums for tools that could be furnished promptly were a natural result of these conditions and second-hand tools were eagerly sought at prices closely approximating those of new machines.

First checked by the effects of an over strenuous demand, purchases for forward delivery were well nigh suspended through the latter half of the year. Curtailment of industrial operations and vigorous retrenchment inaugurated by the railroads finally affected trade to such an extent that by the end of the year reaction had carried business to the opposite extreme. Following the sudden contraction of currency in November cancellations of orders placed earlier in the year became numerous and instead of a crying demand for shipment, requests for postponement became general. Notwithstanding the rebounding change from excessive activity to sluggish inaction, the year has on the whole yielded net results, which, though short of early estimates, were equal to, if not in excess of, the normal of yearly averages.

Chief among the enterprises contributing to the demand for machinery in this district was the new steel plant of the United States Steel Corporation, now in course of construction at Gary, Ind. A large amount of equipment, including pumps, boilers, engines, and electrical machinery, were installed during the year. An extensive machine shop and boiler shop equipped with modern tools were completed. Completion of work projected for 1908 contemplates large additions to equipment already provided, much of which is now under construction.

Adverse financial conditions caused the withdrawal of a number of important plans for plant construction and machinery purchases which would otherwise have added generously to the year's machinery business. Among these are included new shops for the Pullman Company and a new plant for the Chicago Railway Equipment Company. The purchase of a large amount of machinery on which bids were offered was postponed, which, with a favorable turn of the tide, will come into the market in 1908. Prominent among the numerous lists of this character are those of the Corn Products Company, equipment for a proposed plant at Summit, Ill., on which work has been begun; the new shops of the Frisco System, at Springfield, Mo., buildings well along toward completion and machinery requirements fully determined; the Chicago, Lake Shore & Eastern Railroad, machinery equipment for new car shops at Gary; Chicago Board of Education, tools for the equipment of two manual training schools on which bids will again be asked in January or February.

Under the direction of the Electrical Trades Exposition Company, the third annual Electrical Show will be held at the Coliseum, January 13-25. Last year this show attracted a large number of manufacturers of electrical machinery and appliances, and was attended by large crowds of interested visitors. Elaborate preparations have been made this year to present attractions in electrical displays, lighting effects and decorations that will eclipse all former efforts. From the fact that a large portion of the space for exhibits has already been taken, there is reason to believe that before the opening none will remain unsold. Large sections have been reserved by the Western Electric Company, General Electric Company, Chicago Pneumatic Tool Company, and other leading manufacturers of electrical machinery and equipment. McDowell, Stocker & Co. will have on exhibition a number of machine tools equipped with individual motor drive of the latest design. They will show two styles of motor driven engine lathes, one shaper, one riveting machine and a punch press. The latter will be in operation, and will punch aluminum discs which will be distributed to visitors as souvenirs.

Tool Requirements of the Chicago, Milwaukee & St. Paul Railroad.

The following list comprises requirements of woodworking machinery for which the Chicago, Milwaukee & St. Paul Railroad, Chicago, is now in the market:

One No. 4 patent band scroll and resaw, one swing saw, to carry a 24-in. saw; one five-spindle boring machine, with two universal spindles; one one-spindle horizontal radial car borer, one one-spindle universal horizontal boring machine, one large automatic car gainer, one No. 8 extra range horizontal hollow chisel mortiser, two four-spindle horizontal boring machines, one universal wood worker, one planer and sizer to dress timber, one four-spindle gang boring machine, 10-ft. bed; one shaper, one improved variety saw, one tool grinder, one automatic band saw setting machine, one 30-in. single surface planer, with sectional feed roll; one 60-in., three-drum sander; one 20-in. jointer, one universal double circular saw, one variety tip-table saw bench, one jig saw, one one-spindle universal horizontal boring machine, one two-spindle horizontal boring machine, one 10-in. outside moulder, one 12-in. jointer, one rip saw, one cut-off saw and one extra 12-in. cut-off saw, two shapers, one turning lathe, 18-in. swing, to turn lengths up to 8 ft.; one 4-in. four-side moulder, one automatic circular saw sharpener, one hand gaining machine, one Beach patent drill chuck.

Fairbanks, Morse & Co., Chicago, are erecting a new building at Wabash avenue and Eldredge court, which it is expected will be ready for occupancy about March or April. When completed the offices and storerooms of the company, now at Franklin and Monroe streets, will be transferred to the new quarters, which will afford every modern convenience for the transaction of its business. The first floor will be used as a sample and display room for gas and gasoline engines, scales, compressors, and other machinery manufactured and sold by the company, while the second floor will be handsomely finished and fitted for office purposes.

The B. F. Barnes Company has changed its name to Rockford Drilling Machine Company. This step was taken because of the multiplicity of Barnes companies manufacturing machine tools in Rockford, Ill., there being three of that style with only slight variation in their corporate names.

Cleveland Machinery Market.

CLEVELAND, OHIO, December 30, 1907.

Conditions have not changed in the local machinery market during the past week, with the exception that inquiries have been a little better. Dealers regard the outlook as quite encouraging, and expect a fair volume of business to develop about the middle of January. Actual sales of machine tools show no improvement over the previous few weeks, but dealers did not look for any renewal of activity during the holidays. The inquiries that have been received in the past two months amount to quite a fair volume in the aggregate, and it is believed that a large proportion of them will lead to sales soon after the first of the year, when, it is expected, business conditions will be further improved. A few scattering orders for single tools have been booked during the week, but the majority of those making inquiries say they are not ready to make purchases.

There have been no further cancellations of orders for machine tools in the past week or two, but of those who have canceled their orders in the past two months none have as yet come into the market with renewals. However, if business improves as much as is expected in the early part of the year, a large number of renewals are expected. Second-hand tools are quite scarce, very few being offered for sale to the dealers. This is attributed to the fact that manufacturers are keeping all their old tools until they are ready to replace them with new ones. Prices are being firmly maintaind on the general lines of machine tools, but some builders of punches and presses have recently revised their price lists, making quotations about 5 per cent. lower than those that had recently prevailed. Although prompt deliveries can be secured on the general run of sizes of machine tools, there is still considerable complaint from purchasers of slow deliveries on special sizes. This is particularly true of milling machines, on most sizes of which prompt deliveries cannot yet be secured.

The situation as regards machinery manufacturers and other industrial plants has not improved to any marked extent. A few report a slight improvement in orders, but, as a rule, about everybody is holding off until after the turn of the year to make purchases. A number of plants shut down during the holidays for inventories. In spite of the cancellation of orders, many plants that have been running at greatly reduced capacity still have enough work on hand to keep them busy, but found curtailment necessary because of the financial stringency. The money situation is rapidly improving, and not much further trouble is expected on this score.

Owing to the conservative policy adopted by the automobile builders in restricting their output for the coming year, manufacturers of automobile parts are suffering more than most other industries because of the falling off in orders. Some of the automobile builders, however, have increased their working force in the past week or two, and one automobile maker, who has confidence in the future, has placed an order in the past few days with a local dealer for two new machine tools.

While foundries in this territory are getting some new contracts for castings for the coming year, the consumers are holding back their specifications, and the work the foundries have on hand is quite limited.

Several important changes will take place in the Cleveland machine tool business with the first of the year. On that date the Republic Belting & Supply Company will take over the agency of the Becker-Brainard Milling Machine Company and will handle the tools made by that company and other lines of tools and machinery that have been sold by William H. Mortimer, the local agent of the Becker-Brainard Company. The latter company's office in the Williamson Building will be abolished, and Mr. Mortimer will go with the Republic Company as assistant sales manager in the machinery and machine tool department. Another new accession to the ranks of the selling force in the Republic's machine department will be F. W. Bowler, who for several years was connected with the Pattison Supply Company, and who for the past few months has been sales manager at the local office of the Modern Machinery & Engineering Company. The machinery and machine tool department of the Republic Company will be in charge of S. C. Cutler, vice-president, who has had charge for the company of the sales in this territory for the B. F. Sturtevant Company and the Sturtevant Mill Company. For the present the Republic Belting & Supply Company will carry only a small stock of machinery and machine tools, but it expects eventually to carry a full line of the machinery and tools of which it has the selling agency. The Republic Company will also make important additions to its belting department on January 1. On that date R. S. Hull, who has had charge of the outside salesmen of the E. R. Ladew Company, New York, manufacturer of belting, will take charge of the belting sales department of the Republic, and Frank S. Bennett, who has been associated with Maloney & Bennett, Chicago, manufacturers of belting, will take charge of the Republic's belting factory. The Republic Company regards the securing of these two men as a very strong acquisition to its belting department.

The Cleveland Crane & Car Company, Wickliffe, Ohio, reports that its business, which had fallen off with the financial depression, has shown much improvement in the past few weeks. Orders in December were much larger than those in November, and its plant is now running at nearly full capacity. In the past two weeks the company has received orders for four cranes from the Wall Paper Mfg. Company, London, England, and for one crane for Cuba, and another for Canada.

The village of Hudson, Ohio, will soon take steps toward the erection of an electric light plant and water works system. Money for the municipal improvements will be furnished by a donor whose name has not been announced, but who is supposed to be the great coal operator, J. W. Ellsworth, who is a native of Hudson.

New England Machinery Market.

WORCESTER, MASS., December 30, 1907.

The year in the machine tool trade is closing in an atmosphere of hopeful expectation. There are signs of awakening business. Here and there a manufacturing plant in metal lines is increasing its production by returning to full schedule of working hours. Others are planning to do the same. The machine tool builders are not affected for the better to any decided extent as yet in the actual volume of new business, though some new orders have been received, together with a greater number of promising inquiries. This branch of manufacturing is usually late in feeling a revival as compared with lines closer to the consumer. Among the dealers some orders have been received which were not expected until after the first of the year, which would be worthy of comment even at a time of prosperity, for the last days of December seldom produce orders. The totals of the sales of the month have been augmented by a share of the list of machines for the West Springfield shops of the New York Central, Boston & Albany Division, the Boston dealers profiting more than was anticipated.

No one has found a reason for changing his views of a reawakening of business in January, increasing in amount in February and March. The manufacturers and dealers share this view; there are few who do not in any line of production that can be named.

Collections continue slow, though some improvement is reported. Banking circles, excepting houses specializing on bonds, are looking for better times, and expect to see improvement as soon as "the January coupons are clipped," to quote one authority. With easier money commercial paper will be more favorably regarded by the banks, which will remove one of the great barriers in the way of a return of prosperity. It should be stated, though, that the New England banks have stood by their regular patrons during the financial crisis. The manufacturer or dealer doing business with one or two banks has fared better than larger concerns which have to sell their paper in the open market. With a resumption of buying of this class of commercial paper an important effect should be produced in bringing about a better demand in the machine tool trade, lack of available funds standing in the way of many purchases of tools that are really needed.

In totaling the year's business in the machinery trade, the past few months have brought down the figures to a point considerably under those of 1906, yet taken altogether 1907 must have been high above the average of past years. Orders placed in 1906, mounting into great sums of money, were delivered in 1907, and consequently figure in the year's business. Probably few will dispute the statement that the 12 months constitute, on the whole, a prosperous period.

In Connecticut the builders of special machinery are quite prosperous. A number of them have all they can do for some time to come, they report, and others are comfortably off in the way of business on their books. New business, including some from abroad, has helped to fill out, though the volume of these orders has not been great. Naturally orders for special machinery cannot be canceled with the same freedom as machinery of standard types; in fact, there has been little inclination on the part of customers to attempt to rescind their contracts for new work. On the contrary cases are cited of efforts to hurry up deliveries that machinery may be more quickly available for manufacturing.

The beginning of a decrease in wages, which it is believed will be general in New England, has been made. Formal announcement of a reduced schedule has been posted in some of the plants in metal lines, 10 per cent. being named. In these instances some disposition to resent the change is shown, and in one case a strike has followed

among tool makers who were specifically mentioned. Wages have been very high, records having been established in most of the trades, brought about by competition for the services of skilled workmen. With a lessened demand for labor it is deemed by the manufacturers only fair that wages should return to a normal level, even though it is expected that business will be better in a short time. The most sanguine expectation, however, is a good average business, and if this hope is realized it would only be obeying the laws of supply and demand if wages should become of an average corresponding to that of the volume of production. Where works have curtailed or shut down the decrease has been effected usually by treating with the workmen as individuals, while they are still employed or upon their return to work, and it is probable that many employers will follow this plan rather than to post notices affecting the men as a unit. This is considered to be an especially effective system of reduction under existing industrial conditions, because of the fact that it has been necessary during the past two years to consider men who are only partially skilled in a specialty as fully trained workmen, and to pay them accordingly, favoring them in somewhat the same degree as really valuable experts. In other words the reduction will be more in the nature of a readjustment on a descending scale than a flat decrease of wages.

Another factor to-day is the advantage taken of the situation to carry out previously formed plans of putting union works on an open shop basis. With works rushed to the last limit of capacity, to deliberately effect the change has seemed too costly an undertaking, unless the issue were forced by the men. The present depression affords this opportunity as well as others for improvements in shop and factory conditions.

The Royal Typewriter Company has not yet closed the contracts for the equipment of its large new factory at Hartford, Conn., but announcement of the awards to the dealers and manufacturers is expected in the near future. The list is a considerable one, and will furnish the trade with the outlet for a nice lot of tools.

The Flexible Tire Company, Springfield, Mass., organized to manufacture a flexible wheel designed to take up vibrations in vehicles, especially automobiles, announces that it will establish a new plant in the near future, probably in Springfield. William G. Marr, New Britain, Conn., is president; Joseph P. Hillard, Springfield, secretary, and Richard J. Talbot, Springfield, treasurer.

Pitt & Scott, Ltd., 39 Broadway, New York, and 138 Milk street, Boston, foreign freight brokers and express carriers, announce that they have accepted the general agency for the United States of a new institution to be known as the Bureau of American Manufacturers in Europe, which, according to the prospectus, will be located in a central part of the city of London, with premises covering 27,000 sq. ft. of floor space already arranged for. The purpose is to have a permanent exhibit in which members will have space. The Bureau management will personally represent them, the whole tending toward advancing the interests of American manufactured products.

Hill, Clarke & Co., Inc., Boston, will be the Eastern distributing agents for the new horizontal boring machine which is being brought out by the Universal Boring Machine Company, Hudson, Mass. Hill, Clarke & Co., Inc., Chicago, will be the Western distributing agents for the machine. The Boston office reports that a foreign demand for the boring machine has already developed, though it is not yet on the market.

Work on the new foundry of the General Electric Company at its Pittsfield, Mass., works is progressing. The steel work is being put in position at the present time, and it is said that the building will be ready for occupancy in the early summer. It will be 175 x 400 ft.

William T. Draper, formerly head of the Draper Company, Hopedale, Mass., states that there is no truth in the newspaper story that a new Draper company has been organized to manufacture textile machinery on a large scale in a plant to be erected at Concord Junction, Mass.

The Hendey Machine Company, Torrington, Conn., manufacturer of lathes, milling machines and shapers, shut down for Christmas Day only. The company states that while at the present time it is not getting a large amount of new business, it still has quite a good number of unfilled orders on its books, and up to the present time has put nothing in stock with the exception of a very few shapers of one or two sizes.

The Lucas Machine Tool Company, Cleveland, Ohio, manufacturer of boring, drilling and milling machines and power forcing presses, announces that it has extended its practice of selling direct to customers by including the New England territory.

The Conant & Donelson Company, Greenfield, Mass., manufacturer of screw plates and other screw cutting tools, will soon build a factory in that town. The details of the building are not yet completed. The company has recently increased its capital stock from $25,000 to $50,000. The business was established four years ago, and in the interim has grown to such an extent that new quarters have become necessary.

The Stamford Rubber Supply Company, Stamford, Conn., has had plans drawn for a new plant. The buildings will be of reinforced concrete, with a main factory, 50 x 122 ft., and two stories; a wing, 18 x 62 ft., and three stories, and a power house, 36 x 50 ft., and one story. The company states that it wishes no machinery specifications at this time.

The Union Metallic Cartridge Company officially states that no authority has been given from any one connected with the company to make the statement that the works of the plant of the Remington Arms Company would be removed from Ilion, N. Y., to Bridgeport, Conn., where the Union Metallic Cartridge Company's works are located. The report has received wide newspaper circulation.

New England industries will be favorably affected by the establishment by the New England Steamship Company of an all-water freight service between Boston and New York, with the three modern freight steamers Bunker Hill, Massachusetts and Old Colony. The Boston terminal will be Central Wharf, and the New York terminal piers 9, 10 and 11, North River. There will be three weekly sailings from each port.

Cincinnati Machinery Market.

CINCINNATI, OHIO, December 30, 1907.

The experience of the late fall is regarded by most Cincinnati manufacturers, particularly in the tool line, as a valuable one, albeit some of them have suffered pecuniary loss, and may not recover from the ill effects for several months. It is pointed out by older and more conservative concerns that the pace of the first three quarters of 1907 was entirely out of reason; that many small concerns were tempted into doing a business entirely out of proportion to their capital employed, and a toppling over of the producing structure was but a question of time. That that time should have come at the outset of a year of political interference with business is regarded as fortunate, or less unfortunate, for there is opportunity to divert a share of the responsibility. However, as noted in last week's report, there are actually establishments in this field which have felt no appreciable ill effects of the slump, and these concerns will have shut down but two days of the holiday season—Christmas day and New Year's day. Monday, the 6th, has been set by a number of large concerns which were running on reduced time and forces in the middle of December, and have been closed down during holiday week, to resume operations on practically a normal basis.

Reports from the South indicate that much machinery will be needed in that locality. The South American market looks especially promising. Some local tool manufacturers have given this latter field particular attention the past few years, and have accumulated data and figures which warrant a feeling that business from that section the coming year is to be big.

J. A. Andrews of the Newport Rolling Mill Company has just closed a contract with Pittsburgh parties for engines and other important machinery to be installed in the new plant of that company. Equipment for this establishment is being assembled, and the intention is to start up about April 1. This improvement represents an investment of $1,000,000.

The Barriett Electric Mfg. Company, 327 East Sixth street, has been reorganized, with Henry Burkhold as president and Philip Swing organizer and builder, of what is known as the Swing line, a traction property running up into Lebanon and vicinity, as secretary and general manager. The company will continue the manufacture of motors.

Along with the promised improvements in other manufacturing lines, the indications seem better for a resumption of activity in the two foundries that have been idle, one of them, the Steel Foundry, at Winton place, for a year or more, and the Weber Iron Foundry, which has been in the hands of a trustee in bankruptcy for only a few weeks. It is rumored that a large manufacturing concern of the Northwest is figuring on the first named property.

In the Hamilton District there have been no actual shutdowns, and most of the large establishments there have merely reduced time and forces along lines of former years. A large concern manufacturing Corliss engines ran straight through until a few days before Christmas on full time, and will resume its normal gait about January 6.

Concerns making a specialty of foundry supplies report business improving and collections about normal. Manufacturers of brass and engineers' specialties are running on an average of 45 hr. a week, and while reporting business quiet, believe there will be a very general improvement along about the middle of January. The Lunkenheimer Company closed all departments the day before Christmas and will reopen in all departments January 6. The few days' shutdown will enable this company to make a number of necessary improvements and repairs and outline its programme for the many changes to be made the coming year.

The company will then get into its new brass foundry building, said to be the largest and finest in the world devoted to this specialty.

The Wm. Powell Company is making extensive improvements and additions necessitated by its growing business, and will early in the new year occupy an additional frontage and enlarged office facilities.

A company of capitalists of Vincennes, Ind., has purchased the Recker plant in that place, and will manufacture a corn harvesting and husking machine invented by Joseph Ross.

The capital stock of the Dayton Hydraulic Machinery Company, Dayton, Ohio, has been increased to $350,000, for which 6 per cent. preferred stock will be issued. The business of the company is to be expanded.

Government Purchases.

WASHINGTON, D. C., December 30, 1907.

The Isthmian Canal Commission will soon ask bids for twelve rock drills, complete.

The Isthmian Canal Commission will receive bids until January 20, circular No. 412, for engine and generator, engine driven exciter, sand pumps, valve reseating machine, pump governors, &c.

The Isthmian Canal Commission will soon purchase one upright drill press.

The following bids were opened November 18 for locomotives, hoisting engines and boilers for Fort Stevens, Ore.:

Three locomotives—Bidder 1, Lima Locomotive & Machine Company, Lima, Ohio, $3585; 2, Baldwin Locomotive Works, Philadelphia, $3640; 3, H. K. Porter Company, Pittsburgh, $3092.50; 4, H. K. Porter Company, Pittsburgh, $3247.50; 5, Vulcan Iron Works, Wilkes-Barre, Pa., $3300; 6, American Locomotive Company, New York, $3300; 7, Davenport Locomotive Works, Davenport, Iowa, $3032.50, acceptance recommended, lowest bid upon satisfactory locomotive; 8, Portland Machinery Company, Portland, Ore., $3040; 9, J. J. Shannon & Co., Philadelphia, $3480.

Four single drum hoisting engines—Bidder 8, Portland Machinery Company, Portland, Ore., $1995; 9, J. J. Shannon & Co., Philadelphia, $1492.30; 10, G. & W. Mfg. Company, New York, $1479; 11, Willamette Iron Works, Portland, Ore., $1350, acceptance recommended, lowest bid upon satisfactory engine; 12, William B. Hough & Co., Chicago, $1450; 14, Reierson Machinery Company, Portland, Ore., $1395; 15, American Hoist & Derrick Company, Portland, Ore., $1816; 16, Tatum & Bowen, Portland, Ore., $1567.

Alternate bids were received on six single drum hoisting engines, but owing to the unsettled condition of the market it is considered best to purchase only four engines instead of six. Alternate bids were also received for four double drum hoisting engines and six double drum hoisting engines, but these bids were not considered, single drum engines being considered satisfactory.

Two boilers—Bidder 8, Portland Machinery Company, Portland, Ore., $1465; 9, J. J. Shannon & Co., Philadelphia, Pa., $1407.05 and $1717.05; 17, Gould Company, Portland, Ore., $1430 and $1595; 18, J. M. Arthur & Co., Portland, Ore., $1837; 20, Caldwell Bros. Company, Seattle, Wash., $1374, acceptance recommended, lowest bid upon satisfactory boilers; 21, Joshua Hendy Iron Works, San Francisco, Cal., $1656.

Under bids opened October 14 for supplies for the Isthmian Canal Commission, circular No. 392, Manning, Maxwell & Moore, New York, have been awarded class 18, one tool room engine lathe, $833.

The following awards have been made for supplies for the navy yards, bids for which were opened December 10:

Niles-Bement-Pond Company, New York, class 13, one engine lathe, $1085.

H. A. Rogers Company, New York, class 118, 45 hydraulic jacks, $1588.35.

The Vandyck-Churchill Company, New York, has been awarded class 62, one four-spindle nut tapper, $425, under opening of October 29, for supplies for the navy yards.

OBITUARY.

DR. COLEMAN SELLERS.

Dr. Coleman Sellers died at his home in Philadelphia December 28, aged 81 years. He was born in Philadelphia and his education was obtained at private schools and at Bolmar's Academy, West Chester, Pa. He first went to work in 1846 as a draftsman in the Globe rolling mill, Cincinnati, Ohio, and was soon advanced to superintendent. Three years later he entered the services of Niles & Co., locomotive builders, and remained with them for five years as foreman. In 1856, at the request of his kinsman, the senior partner of the firm of William Sellers & Co., he returned to Philadelphia and entered that establishment as chief engineer. Later he was admitted to to the firm as a partner. He retired from active interest in the business in 1888 and had since devoted himself to private practice as a consulting engineer.

One of the first and most important of Dr. Sellers' inventions was the coupling device for connecting shafting. His connection of feeds for lathes and other machinery tools solved the problem of infinite gradation of feeds. His other inventions have done much to advance the efficiency of mechanical appliances. In 1861 he recommended the use of absorbent cotton for surgical purposes, which has since become indispensable. In connection with his experiments in photography he proposed the employment of glycerine to keep the plates damp. In 1889 he was called upon by several capitalists to consider the possibility of developing the water power of Niagara Falls. Upon his advice the enterprise was undertaken and proved successful. Since 1890 he had been the acting engineer of the Cataract Constructing Company and the chief engineer of the Niagara Falls Power Company. The important mechanical features of the great dynamos are of his design and invention.

The King of Sweden in 1887 conferred on Dr. Sellers the Royal Norwegian Order of St. Olaf. In 1888 he received from the Stevens Institute the degree of D. E., and one year later the University of Pennsylvania conferred upon him the degree of D. Sc. He was a member of the Board of Managers of the Franklin Institute and had been its president for five years. He had also been president of the American Society of Mechanical Engineers and of the Pennsylvania Museum and School of Industrial Art.

HARRISON LORING, SR., one of the first American builders of iron steamships, died at Roxbury, Mass., December 26, aged 85 years. He was the founder and for years the proprietor of the City Point Works, South Boston, where many famous ships were built. His exceptional inventive ability also led him into various other branches of engineering, including pulp and paper mill machinery, in the earlier development of which he played an important part. He built the first air compressor used to supply fresh air during the construction of the Hoosac Tunnel, and many of the lighthouses of the Atlantic Coast were his creations. He was born in Massachusetts, and when 17 years old was apprenticed to a millwright and steam engine builder at South Boston, and worked as a journeyman until 1847, when he engaged in business for himself. Ten years later he established the City Point Works. Among the first of his merchant ships was the De Molay, which was fitted with a ventilating system of piping, a then unique idea that attracted a great deal of attention. The United States Government gave the system a test by chartering the vessel, and afterward purchased it for use as a hospital ship, in which capacity it served during the Civil War. Of the war vessels which took prominent part in that conflict Mr. Loring built the Winnipeg, Huron and Chocorua, and the monitors Nahant and Canonicus. The engines and machinery of Farragut's flagship Hartford were constructed at these yards. A number of the earlier Atlantic liners were built there. As late as 1890 he built the cruiser Marblehead, four lightships and several sea-going tugs. Before the Civil War he manufactured sugar machinery for Cuba on a large scale, and in 1855 the first rotary printing press was built in his shops. He leaves a widow, three sons and a daughter.

WILLIAM E. BIDDLE, head of the Biddle & Smart Carriage Company, Amesbury, Mass., and part owner of the Amesbury Brass & Foundry Company, died December 27, aged 62 years. He managed what is said to be the largest factory for the manufacture of automobile bodies in the country. He was a native of Millbury, Mass. He leaves a widow, a son, William E. Biddle, Jr., vice-president of the Biddle & Smart Company, and two daughters.

SAMUEL A. KENSIL, president of the Tioga Foundry Company and Keystone Spring Works, died December 24, at his home in Philadelphia, aged 74 years. He had been prominent in charitable work.

GEORGE E. NEEDHAM, for many years president of the Garry Iron Roofing Company, Cleveland, now the Garry Iron & Steel Company, died December 29, after a short illness. He retired from business several years ago.

The equivalent coal consumption of various forms of pumps is compared in the London *Iron and Coal Trades Review*, as follows: Triplex power pumps, 1½ to 5 lb.; small steam pumps, 25 lb.; large compound steam pumps, 13 lb.; pulsometer pumps, 60 to 70 lb., and injectors and inspirators, 100 lb. per horsepower per hour.

PERSONAL.

Charles E. Sargent, who for the past seven years has been manager of the Sargent Engineering Company, Plymouth Building, Chicago, has resigned to accept the position of chief engineer and manager of the gas engine department of the Wisconsin Engine Company, Corliss, Wis., which will now build the Sargent complete expansion gas engine, the invention of Mr. Sargent. The Sargent Engineering Company's specialty has been the designing and testing of internal combustion engines and producers, and while engaged in this work Mr. Sargent saw the necessity of better testing apparatus, and invented and put upon the market an automatic gas calorimeter, an integrating dynamometer, a dust determinator for dirty gas, a gas washer and the Sargent draft gauge, steam meter and anglemeter. His successor in the management of the Sargent Engineering Company is C. E. Beck, who has heretofore been assistant manager and engineer.

Howard T. Muzzy, formerly with the Pittsburgh office of the Cooper-Hewitt Lamp Company, has resigned to accept a position as Pittsburgh District salesman for the Pennsylvania Steel Pulley Company, Pittsburgh. Stuart L. Howes, formerly with the Boston branch of the Fairbanks Company, has accepted a position with the pulley company, and will act as its special agency salesman.

Albert Ladd Colby, consulting engineer, of New York, who left for Germany last July on by-product coke oven matters, has postponed his return until March. His address is Park Hotel, Rudolf Platz, Cologne.

R. M. Stuart-Wortly has retired from the stock exchange firm of Edward Sweet & Co. to become treasurer of the United Metals Selling Company of New York.

W. C. Davis, rail mill roller for the Algoma Steel Company, Sault Ste. Marie, Ont., has resigned to accept a similar position with the Dominion Iron & Steel Company, Sydney, Nova Scotia.

Dr. Haarmann, the ironmaster, of Osnabrueck, Germany, has just been awarded the Carl Lueg medal by the Verein Deutscher Eisenhuettenleute, for his life long work in connection with the design and introduction of the steel railroad tie.

Benjamin Talbot has been unanimously elected managing director of the Cargo Fleet Iron Company, Ltd., of Middlesbrough, England. At the plant a fourth Talbot furnace is soon to start, and another blast furnace is to be erected at once.

George Baker, sales manager of the Illinois Steel Company, has also been appointed manager of sales at Chicago for the Tennessee Coal, Iron & Railroad Company recently acquired by the United States Steel Corporation. A. H. Carpenter, formerly sales agent of the Tennessee Company, will have charge of the pig iron department under Mr. Baker.

John Becker has been elected treasurer and general manager of the Becker-Brainard Milling Machine Company, Hyde Park, Mass., succeeding A. L. Lovejoy, resigned.

Calvin Wells, president of the Pittsburgh Forge & Iron Company, Pittsburgh, and proprietor of the Philadelphia *Press*, celebrated his eightieth birthday anniversary on Thursday, December 26, receiving the congratulations of his friends and having with him his children and grandchildren to the number of 19.

Edwin H. Fowle, who has represented the Western Tube Company on the Pacific Coast as general sales agent for some years, has removed to Denver, Colo., where he will open offices in the Majestic Building. He will represent the Carnegie Steel Company, the Illinois Steel Company, the American Sheet & Tin Plate Company and the National Tube Company, in addition to his original line. In San Francisco the representation of the Western Tube Company will be taken over by one of the above mentioned concerns, all of which have offices on the ninth floor of the Crocker Building.

It has been incorrectly reported that V. L. Wills, formerly connected with the Tennessee Coal, Iron & Railroad Company, as assistant superintendent of furnaces at Ensley, Ala., has engaged with the Inland Steel Company, Chicago. No such connection has been made.

Floyd Rose, superintendent of the Portsmouth Steel Company, Portsmouth, Ohio, has resigned.

George Collord, formerly superintendent of the Ensley furnaces of the Tennessee Coal, Iron & Railroad Company, has resigned that position, having been appointed general superintendent of furnaces of the Shenango Furnace Company, Sharpsville, Pa., taking effect January 1. W. A. Barrows, Jr., has been given a vacation of a few months, and on his return will be transferred to other duties in a different department.

Quincy Bent, manager of the Pennsylvania Steel Company's blast furnaces at Lebanon, Pa., has gone to Cuba on a trip to the company's new iron ore property in the Mayari District.

Receivers for the Passaic Steel Company.

The United States District Court at Trenton, N. J., on December 30 appointed John R. Lee, Oakley Cook and William Arnold of Paterson, receivers of the Passaic Steel Company, Paterson, N. J. The bonds of the receivers were fixed at $150,000 each. Joseph O'Brien and Michael Martin of Scranton made the application for the receivership on the grounds that interest on the $2,500,000 of gold bonds had not been paid for October, 1906; April, 1907, and October, 1907, and that the corporation owed the city of Paterson three years' taxes amounting to $45,000. The directors joined with the applicants for a receiver, and admitted insolvency. It was stated in court in connection with the application that the company's financial difficulties dated from its earlier days after the acquisition of the property of the Passaic Rolling Mill Company. The transfer to the Passaic Steel Company was made in February, 1903. The new company issued $5,000,000 of stock, and there was a bond issue of $2,500,000, of which the proceeds of $2,000,000 went to the purchase of the leading holdings of the old company.

In 1905 $1,000,000 of preferred stock was issued by the company for improvements, a part of it being taken by various creditors. From that time the company has been hampered financially and various changes in management have taken place. For several months its rolling mills have been idle, owing in the beginning to the high price of raw materials and inability to make steel at a profit. The plant at Paterson consists of two 50-ton and five 25-ton open hearth furnaces, 21 in. and 28 in. structural mills and a 30-in. universal mill. There is also a fabricating shop with an annual capacity of 12,000 tons.

The Cincinnati Foundry Foremen Meet.

The holiday meeting of the Cincinnati section of Associated Foundry Foremen occurred on the evening of December 28. After a dinner the members listened to addresses by Prof. John J. Porter of the University of Cincinnati and James A. Murphy, foreman of the Hooven-Owens-Rentschler Company's foundry at Hamilton, Ohio. Professor Porter's subject was "Direct Castings from Blast Furnace Metal," Mr. Murphy's "The Jobbing Foundry." President C. H. Thomas, who is at the head of the Model Foundry Company, the new enterprise of the Cincinnati Milling Machine Company and other large local interests, presided at the meeting.

It was reported that Cincinnati has the best chance for the 1909 meeting of the national organization, which the coming year goes to Toronto, Canada. The next or at least an early meeting of the local association will be held in Dayton, Ohio, the home of the National Cash Register Company, whose foundry superintendent, John A. Logan, is an enthusiastic member of the Cincinnati organization, and will give arrangements for the meeting his careful attention. Arrangements are to be made for an illustrated lecture on a new molding machine for handling complicated and special castings at the next meeting of the organization on Saturday, January 25.

HARDWARE

IT is eminently proper for retail merchants in the towns and villages throughout the country to oppose by all legitimate means the encroachments of the catalogue houses, whose competition is already so troublesome and whose growth is so serious a menace to the smaller distributers. To break the force of the fact that the catalogue houses militate against the welfare of the retail merchants is set up the claim that they serve the public, and that individual or class interests must give way. If the claim that the catalogue houses are a benefit to the public is well founded, the opposition of merchants, wholesale and retail, will fail to be justified in the judgment of those who take a broad view of the subject. On the other hand, if the public really needs the catalogue house and finds its welfare promoted by its operations, the opposition of the merchants is sure to come to naught. If, considered in all its bearings and influences and results, the system of these great mail order houses conducted in a few of the commercial centers is a good thing for the country, it may be accepted as settled that these houses will continue to grow in spite of all efforts to repress them.

The fundamental question in connection with the catalogue house competition is whether or not it is, taken all in all, a good thing. Those who oppose this method of distribution maintain, and we believe rightly, that the system by which a few great houses in a few large cities sell goods throughout practically the entire country by means of printed catalogues and without giving their customers an opportunity to inspect the goods, is in many ways exceedingly undesirable, in view of the interests of the public generally. If this contention is well founded, merchants, as citizens taking a broad view of things, are justified in opposing catalogue house methods on grounds of public policy, and not simply because this method of distribution is injurious to their own business.

There are many considerations which might with propriety be urged against the catalogue houses on the ground of public policy. We allude now to only one—the injurious influence which this system of distribution has on the smaller communities, especially in the rural districts. Just so far as this method of marketing goods prevails do the local merchants suffer. If it should greatly extend, the selling of goods by the smaller merchants throughout the country would greatly diminish. Little by little their business would dry up. Many of them would sooner or later be obliged to shut up shop. The tendency of the mail order business is to build up the great cities at the expense of the towns and villages. With a merchandise post by which goods relatively bulky could be sent thousands of miles for the same postage that would carry them 10 miles, it is hard to set a limit to the growth of this method of distribution. Under such influences it is conceivable that the story given on another page of A DESERTED VILLAGE would find many a counterpart in real life. On the broadest principles of public utility merchants and citizens generally are justified in repressing as far as possible catalogue house encroachments on the trade of the smaller communities, where resides so much of the intelligence, strength and virtue of the land.

Condition of Trade.

At the opening of the past year we were, as recent events have shown, in the culminating period of a long era of expansion in business. Trade was of large volume and commodities were selling at a range of prices attained by successive advances during the previous year. There was a shortage of many Hardware products, and merchants in many cases still felt it wise to discount a continuation of the upward movement by liberal if not speculative purchases. Supplies of raw material were inadequate to meet the requirements of manufacturers who were also handicapped by scarcity of labor and delays in transportation. Business was being conducted at a high tension. Wiser heads foresaw that the feverish pace could not be indefinitely maintained, but without much appreciable lull, winter was succeeded by spring and the half year closed with record breaking totals. After the changes incident to the early part of the year prices showed little tendency to advance further in spite of the unusual volume of business. Speculative purchases ceased, and while the jobbing trade continued in undiminished activity it was apparent that manufacturers were catching up with their deliveries, and that large buyers were growing conservative with regard to their future requirements. A financial stringency developed and collections became slower and more difficult. Many in the commercial world gave little heed to these signs of reaction, and there continued to be a large, though diminished volume of business. Summer dullness set in early and was accentuated by the uncertainty of the Copper market in which, after a slight reaction, buyers and sellers came to a deadlock. This was followed in the late summer and early fall by a break in prices and a demoralized condition in quotations on the finished product. A sympathetic effect of this break was felt in other branches of the trade. Notwithstanding the beneficial influence of the generally favorable crop situation there was increased financial stringency and collapse of the securities markets, succeeded by an acute shortage of currency. Inability to get cash for payrolls, the apprehension of stagnation in business and possible financial disaster led to the shutting down of many factories. Building operations slackened materially and industrial enterprises were postponed. Notwithstanding this condition of things, with a much smaller volume of business and weakness in the raw material, the prices of Hardware have been pretty well maintained. With many minor concessions there has been no violent and general break, a very satisfactory result which is to be credited largely to the good sense, the conservatism and the disposition to work together for the good of all, which has been exhibited by the leading manufacturers. The situation to-day is not without many elements of hopefulness. Jobbers have been reducing their stocks and have attempted no replenishment, except to fill in immediate requirements. When the spring trade opens they will probably need to place fair sized orders which will keep manufacturers moderately busy, especially as their production has been greatly curtailed. The possibility of a shortage of goods in some lines is also to be recognized. Retail trade still continues at least fair in many sections. Agricultural communities are prosperous, and have a purchasing ability probably greater than ever before. Reasonable reductions in prices in the presence of slack-

ened demand and lower raw material should not be regarded as undesirable when the interests of the trade in the long run are considered. The effect of the existing quiet in business with the jobbers and manufacturers is to reduce stocks in the merchants' stores and warehouses, thus laying a solid foundation for a brisk demand, which is expected to set in before long. With the people of the country, and especially the farmers well off financially, and with merchants and manufacturers in possession of assets which in general largely exceed their liabilities, the commercial situation seems to be fundamentally sound. In spite of the uncertainty always to be reckoned with in a Presidential year, it is hoped that 1908 will bring a marked improvement in the situation and a profitable business.

Chicago.

Attention has been so far diverted from serious business by holiday pleasures that the jobbing trade for the week has, as a matter of course, been quiet. With characteristic enterprise, the retail dealers are now prepared to cater more than ever to the wants of gift buyers at this season, and it is no longer a period of enforced dullness with them. While not so large perhaps as in former years, the local trade enjoyed a prosperous and profitable business on special lines. Some disappointment was felt at the poor demand for Skates, which on account of the mild weather prevailing, did not move. Other lines, such as Cutlery, Scroll Saws, Chafing Dishes, &c., found ready sale. The Christmas shopper is being more and more attracted to the Hardware stocks for suitable gift articles, and with proper attention to the requirements of such trade the Hardware merchant can do much toward adding to the popularity and profit of his business. For the coming week or 10 days the trade will doubtless be fully occupied with inventory work and squaring up accounts for the year. In the meantime salesmen will be returning to their work, so that in all probability there will be no acceleration of business until well toward the middle of the month. If by that time confidence in existing price levels is established there should be a decided improvement in demand. It is stated on good authority that stocks both of jobbers and retailers throughout the country are rather below than above normal, and are steadily being depleted without corresponding replenishment. Consumption, even if restricted, still goes on, and there seems, therefore, to be something substantial back of the belief in the renewal of buying that is expected early in the year.

St. Louis.

NORVELL-SHAPLEIGH HARDWARE COMPANY.—1907 came in like a lion and has crawled out like a lamb—and a well sheared lamb at that. Notwithstanding the decrease in business the last two months of the year, 1907 will not make a bad showing. We "made hay while the sun shone," and when it rained we tried to get in out of the wet.

There is always a bright side to every prospect. Suppose the panic had arrived in July instead of November 1. What would have happened to our fall business. Taking it all in all, if a panic was inevitable, in many ways it could not have come at a more opportune time than it did. Our fall goods had been shipped. We were collecting instead of borrowing money. We were already drawing in instead of spreading out. Things might have been a good deal worse.

Retail Christmas trade here in St. Louis, judging by the crowds and the reports of the various stores, seems to have been fully equal to any former year. In fact, many of our large department stores report better Christmas sales than a year ago.

A strange feature of the Christmas shopping was the fact that great quantities of real money—actual cash in coin of the realm—came from somewhere. "John Doe" checks were not in evidence. Santa Claus has done more than the Honorable Secretary of the Treasury of these United States to put actual money into circulation.

We note, however, that you wish us to prephesy for the future. Therefore, as the seventh son of a seventh son, we "take a chance." We can only be right or wrong, so 50 per cent. of the chances are in our favor.

We predict a very fair volume of business the next six months. The crops and the money are in the country, and there is actually no good reason why the agricultural districts especially should not be in prosperous condition.

It may be a little selfish to refer to it, but bad times often helps the jobbers. It is our custom to put a small merchant into business. We sell him $2000 worth of goods when he has $1000 cash. We nurse him along until he pays out. During this period he buys carefully and in fractions of a dozen.

After a while, when he becomes independent, along comes a special salesman direct from a manufacturer. Then where formerly he bought in lots of one-quarter dozen he buys a gross. He is justified in doing this because he gets the same price as the jobber. Why pay the middleman a profit? Of course he buys enough of the item at one time to last him two years—but then just think of that 5 per cent.!

Laying joking aside, in very good times the retail trade will buy from almost every fellow who comes along. In bad times they concentrate their purchases, they cut out the salesman who wants orders for gross lots, and those jobbers who happen to be on the favored list often get as much or more business from many customers than they did in good times.

We cannot but feel the recent financial flurry was, in a large measure, unnecessary. One of the reasons for the panic was that so many financial prognosticators had decided it was due. We had been prosperous too long. Notwithstanding the protestations of some of our banking friends, we still believe they lost their nerve. We still think many banks issued clearing house checks when there was no necessity for it. It is still a question in our minds whether it was wise for the banks, through the clearing house, to take united action and tide over the "weak brothers," or whether it would not have been better to let nature take its course.

The papers have fully advised the public of every movement of the banks, and it is a question if the scramble of the banks to get under the protection of clearing house checks has not done more than anything else to cause a lack of confidence on the part of the people.

Then does it not seem queer that the trust companies should put vast sums of money into fire and burlgar proof vaults and rent safe deposit boxes, when in such times as we have recently had they so much object to the people putting their money into these boxes?

Have we not in the past 60 days witnessed a too evident attempt on the part of those who are interested to tell the people just what they should do with their own money?

Millions of people never borrow any money. They are never under obligations to any of the banks. On the other hand, the banks are under obligations to them for their deposits. It would therefore appear more consistent for the depositors to give the banks advice than to have advice coming the other way. Who is the dog and who is the tail?

But all this, we are thankful to say, is almost ancient history. In future we will keep a weather eye open for a year ending with an odd number. We notice all the panics have happened in years that ended in 7 or 3. Therefore we can now breathe easily until 1913.

All jobbers are naturally interested in the course of prices in the next few months. As *The Iron Age* has stated, some of these prices are under suspicion. In our opinion there is only one way to get rid of this suspicion, and that is for manufacturers to maintain prices. We believe if prices are reduced there will be still more "suspicion."

It has been announced by the strongest manufacturing interests that, while production would be curtailed, prices would not be reduced. These announcements have been received with loud applause.

Now if after such proclamations at the beginning of the panic prices should be reduced it will not help business, but will simply increase "suspicion." If some of the

big manufacturing corporations cannot hold the market level, as they have claimed, what are they here for?

In looking forward to the business of the next six months, we believe the crucial test will be what happens in the months of January and February. If prices are maintained throughout these months everything will be lovely. If, however, the large manufacturing interests reduce prices they will be quickly followed by the small interests. Both jobbers and retail dealers will be timid in buying.

If we do not have a fair business in January and February then the game is up for the first half of the year. Spring buying is like a man who needs an overcoat or a stove. If he has not bought by January he decides he can go through the winter without them. If spring goods are not bought by March 1 then they won't be bought. The dealers will get through the season without them. The catalogue houses will get the business.

On the other hand, if the trade finds the manufacturers are carrying out their announcements that they would maintain prices they will not be afraid to buy.

It is all a matter of sentiment, anyhow. Thousands of communities have actually not been affected by the panic. If they did not read the newspapers they would not know there was such a thing in the land.

Even if there were reductions in prices it would not amount to much to the average retail dealer on his year's business. But as long as he thinks it would, and as long as he won't buy for fear his $3000 stock might decline in value 5 per cent., or $150, in the course of a year, we must take his feelings into consideration.

We therefore believe it would be to the general interest of the merchants in the Hardware line if there were no reductions in prices in the immediate future, and we further will go on record as stating we do not look forward to serious reductions of any kind. We believe the manufacturers to-day are a smarter class of men than they were 20 years ago. They must know that reductions in prices will not stimulate business.

Then again, taking into consideration the increased cost of many other commodities, it is our opinion goods in our line, upon the average, are not too high. It surely must be known that the advances in our line have been nothing compared to the advances in other lines of business, and it seems to us some of these other lines should come down a whole lot before we start to reduce Hardware.

We look upon the Hardware trade to-day as being a patient who needs only a little rest in order to fully recuperate. We trust he won't have a bunch of firecrackers in the shape of declines in prices let go under him to disturb his already shattered nerves.

We wish *The Iron Age*, its officers and employees, and the general Hardware trade a happy and prosperous New Year, and we assure them they can have entire confidence in the situation as the year 1908 does not end in an odd number. Look out for 1913. (This prophecy is patented. All rights reserved.)

Portland, Oregon.

FAILING, HAINES & MCCALMAN.—The year just closing has been a remarkably prosperous one for this section of the country, taking it as a whole. Crops have been good in all lines and prices have been more than fair, excepting on hops. The year was remarkable up to about November 1 for the increase in business over previous years which was common to all firms in our line, and, in fact, in all mercantile lines. The only trouble we have had here which has really affected the merchants of this territory seriously has been the cessation of lumbering in Oregon and Washington, due to the rise of the lumber rate to points east of Salt Lake. This rate effectually shut the Oregon and Washington lumbermen off from all territory east of this point, and in consequence shut down practically all the lumber camps and mills in this territory except such as were shipping by water. This question, however, is now before the Interstate Commerce Commission, and from a report given the writer by a gentleman who has just left Washington and who is fairly well acquainted with the situation the lumbermen seem to have made out a remarkably good case against the railroads in their endeavor to have the rate lowered to the former one. Should the Interstate Commerce Commission take this view of the case we can expect an immediate revival in activity of lumber interests here.

We, in common with the rest of the country, suffered from the refusal of the New York banks to ship cash to their Western correspondents, but the panic did not affect mercantile trade locally to any great extent. What harm was done was due simply to uncertainty, as our customers all held off as much as possible on buying until they saw the results. Notwithstanding this, we think that local trade, both the holiday lines and regular channels, has for the last two months been fully as good as last year, and in some cases better.

It is true that in this city four banks have been forced to close their doors. Three of these were comparatively small institutions, one having only $9000 on deposit, and the district attorney is investigating the cause of these failures. Whether or not the district attorney will act, it is undoubtedly true that in these three cases the failures were caused by very singular methods of banking. The fourth closing was that of the Merchants National Bank and was caused absolutely by malicious rumors of its insolvency. This bank expects to open with the full concurrence of the Controller of the Currency in about 60 days, with a largely increased capital stock. Merely to show the condition of this bank, which was probably in a weaker condition as regards reserves than the other national banks here, it paid out 45 per cent. of its total deposits in 30 days, and then did not call a single commercial loan, preferring rather to be forced to close its doors than to force its customers who relied on it to cover their notes in the financial conditions that were then prevailing. This bank was absolutely solvent, and would not only have paid its stockholders their full amount of stock, but a very large proportion of the surplus and the undivided profits if it had been liquidated.

As to next year, the outlook is bright. The wheat crop is as yet pretty nearly half in the hands of the farmer; in fact, in Morrow County it is only within the last two weeks that they have finished threshing. What wheat has been sold has not yet by any means been shipped to its final market, and in consequence the money which we will receive for this wheat has not yet been paid us. As a slight indication of the outlook for wheat, there are to-day over 100 vessels chartered to carry wheat to foreign ports. This does not include other than foreign shipments, and it is the largest fleet ever chartered for wheat at any one time at this or any other port on the Pacific Coast. This wheat crop alone means that business will be good with us for the first six months of the year, and as Oregon and Washington have never had a real crop failure, and as our agricultural products are so diversified, it is reasonable to expect that even with fairly moderate prices for our products business will be good all the year. Should the Interstate Commerce Commission take the action desired by the lumbermen, business in Oregon and Washington will receive a decided impetus.

Taking everything into consideration, it seems reasonable and probable that business in this territory will be very good for some time to come. Of course it is probable that business will not be so brisk as it was up to November of this year, but we think we can confidently look forward to doing a very fair business for the next 12 months.

Philadelphia.

SUPPLEE HARDWARE COMPANY.—It is the general feeling that we begin the New Year of 1908 with financial matters improved, and with every appearance of the banks throughout the country resuming business in the usual or ordinary manner, and, it is stated, increasing their deposits by persons not holding them off, and possibly they have largely ceased to advise their customers (as some of them have) to keep up their deposits, which, if done, would prevent their paying their bills as they fell due.

Old Santa Claus made strong efforts to control the feeling of financial anxiety of the many citizens of our

city. Many days before Christmas the city showed great activity, the weather was exceedingly fine, and it is estimated that from 100,000 to 125,000 evergreen trees were scattered for sale through the streets. The department stores, it is stated, added some 20,000 persons temporarily to their force of employees, and it is said that while the purchases of expensive goods were not so great, it is estimated that the variety sold was greater than in previous years. The crowd in the streets on the Saturday before Christmas was something astonishing. The writer in passing out Market street west from Fifth to Fourteenth street took a trolley car, and had reason to estimate that over 100,000 persons, nine-tenths of whom were women, were crowded in the streets. The department stores were jammed. The car had occasion to stop from three to five minutes, and it happened to be in front of one of the three entrances to a large depatrment store, and fully 300 persons passed into that one entrance to the store during the stop. It is stated that over 1,350,000 packages were handled by the express companies in ten days and over 80,000,000 pieces of mail were distributed in 25 days, and from early each morning until midnight wagons were distributing packages.

So far as the above is concerned, there were but few indications of the depressed feeling regarding the financial trouble which has extended so far over the country. It is estimated that over $185,000,000 will be paid out in dividends within 10 days from January 2, and this amount is greater than in any other year. We believe there never was a panic in this country for which there was less actual cause than there has been this year, with the country in such a prosperous condition. It did paralyze and restrict general business throughout the country considerably; but with the opening of the new year it is generally felt that the usual trade conditions will soon present themselves and all collections begin to improve.

Louisville.

BELKNAP HARDWARE & MFG. COMPANY.—The retail shopping, the overloaded mails and expresses and other usual characteristics which mark the Christmas trade did not seem much affected, at least to the ordinary observer, by the recent financial troubles. It may be that the American Santa Claus had to trade off his automobile and go back to old fashioned reindeer and sled transportation, but even with that he got there just the same. The stockings bulged out and ran over, and the old folks had their usual chance to play with the children's new toys.

As to the general wholesale market, there is a good deal of voluntary buying in a small way. Nobody is waiting for prices to go down apparently, but waiting more likely for the demand to come up. There are hundreds of reasons given for believing that the new year will be a prosperous one, and we have hopes of this optimism justifying itself rather early in the year. There are ten optimists to one pessimist, we do believe, but it may be that there is some commercial liquidation due to take place after the financiers have had their dose and resumed their pleasant expressions.

It is evident that a large amount of commercial credit has been fostered by brokerage firms who had the ear of bank presidents and cashiers in prosperous times for almost unlimited money, but the resources of these same gentlemen were sorely put to the test when it came to renewals in October and November. There are some signs of animation indicating revival in that branch of industry just now, provided you do not care what rate of interest you pay. This high rate of interest prevalent, unless the money is turned over very rapidly, is bound to cut a big figure in reducing the earnings on the part of borrowers. It makes a vast difference to the borrower whether money is paying 4 or 8 per cent. One well-known brokerage firm recently sent out a list of names "not at all bad," to use the English phrase, who were willing to pay 10 per cent. on time loans, presumably renewals. Of course as long as this state of affairs continues there will be few new enterprises and certainly precious little speculation.

In the meanwhile, little by little, liquidation is going on; notes as they come due must be paid, or partially paid, but there is no money yet to play with, and but few orders given for future delivery of merchandise. This is the dull time of the year for the Hardware trade anyhow, and most of the dealers take advantage of it to inventory their stock and close up the year's business. Quite a number, however, owing to the dark hours and the demoralizing holiday features of the midwinter season, take stock in spring or early summer. This is growing to be more and more the practice, we believe.

The showing of the banks here was most creditable. All seem to be in excellent shape, and, unlike some few cities in the Western and Southern country, they have not put out any clearing house certificates for circulation. While the supply of currency was well guarded, it was always to be had for pay roll purposes and in legitimate amounts for any depositor. Altogether we are satisfied and gratified with the stand maintained by our financial institutions. It resulted in Louisville exchange being at par in the West and Northwest, and even in the East, when some of the other neighboring cities were offering heavy discounts.

Prices are apparently firm, but it remains to be seen whether controlling interests can uphold prices artificially or whether they are bound to go down in obedience to sentiment and to the general market conditions, which affect commodities other than steel and iron. We smile when Mr. Gompers tells us that labor has had no part in this panic and therefore shall not be made to suffer, because we believe that, whatever our wishes and desires might be in the matter, our political economy is not wrong when it refers us back to the inexorable law of supply and demand. The example of money itself is in point. Nobody wanted to pay the rates demanded by those who had it to lend, but we simply had to do it. It is not unlikely that the advances made to labor in the days of expansion and prosperity will have to take a back track as the prices of commodities decline. But we will not anticipate. We're looking to 1908.

Cleveland.

THE W. BINGHAM COMPANY.—It is said that confidence is not a plant of quick growth, but we believe the plant has started and will continue to grow strong and healthy in the coming days and months, and that trade conditions will improve. Prosperity always brings high prices for commodities and labor, and we have had it all over this country, and we sincerely hope that the clouds of adversity that have lately appeared on the horizon will soon pass away, and that all may enjoy peace, happiness and a good, healthy trade the coming year.

If our factories curtail their products very much there will be a scarcity of some lines of goods very soon, and we are led to believe as the retail merchants have been conservative in buying of late their stocks will soon need replenishing, and we think trade will start in briskly in the early months of the coming year. A great many inquiries are coming to us for season goods, and some good fair orders have been placed for future shipment.

On the whole the outlook to us is quite hopeful, for, as Ambassador Reid has said, "we still have the country that Providence gave us and we still have boundless opportunities, and after every reverse in the past invariably our country has speedily recovered and risen higher and yet higher in commercial prosperity."

We extend to all of our friends and fellow countrymen greeting, and wish that they may all enjoy a prosperous and happy New Year.

Nashville.

GRAY & DUDLEY HARDWARE COMPANY.—In writing our closing report for the year 1907 our mind naturally reverts back to the report sent you at the opening of this year, when we were constrained to predict that 1907 would be a year of great prosperity. We do not now feel called upon to make any apologies for our record as a prophet. While it is true 1907 commercially is not going out in a blaze of glory, yet we have enjoyed during the year ten months of unprecedented prosperity. The year taken as a whole has been unusually satisfactory for business of every kind in this section of country.

Statistics show that the output of the mines, factories and lumber mills of the South during 1907 has broken all previous records. The agricultural, poultry and stock interests have made more money than any previous year.

The people of the South to-day are in better financial condition than they have ever been since the Civil War. If we were not now in the midst of a money panic we would say that 1908 would be a prosperous year, because we have everything in the world that goes to make prosperity, except confidence in our banking and general financial system. This we will not undertake to criticise, but we are strongly impressed with the idea that there must be something radically wrong with it. Our people are by no means discouraged. As a general rule they are not in debt; this particularly applies to the agriculturalist. They know that the country is in good condition and that this financial depression cannot last very long, and every one seems to think that the recovery will be very rapid when confidence is restored. With this obstacle removed, we cannot see any reason why we won't have a good trade in 1908.

Boston.

BIGELOW & DOWSE COMPANY.—1907 is fast nearing its end. It has been a year of general prosperity for the merchant doing a legitimate business and attending to his own affairs. Nineteen hundred and six was considered a banner year, but ten months of 1907 showed a larger volume of business, which will more than make up any slight falling off of sales during the past two months.

Values have been well maintained throughout the year. Collections have been above the average of a series of years. We hear there has been a financial panic, but everything has been in a normal condition in our business world. Speculators and dishonest financiers may have lost fortunes, but legitimate business has met with no serious reverse. Bankers deserted the speculator during the crisis and left him to his own resources, but never for a moment have they failed to support and accommodate the merchant.

Market values for iron and steel products have been firmly held by the large interests working together and curtailing the production to meet the demand. Stock inventories will show a marked reduction in goods on hand as compared with last year. The majority of Hardware products are necessities that are used by the farmer, the mechanic and the whole people. Throughout the year the mechanics and the laborers have been fully employed at high wages.

The farmers were never so prosperous, as the published report of the Secretary of Agriculture shows the value of farm products for 1907 to be $7,412,000,000. This is an increase of about $660,000,000 over their value in 1906.

The great "bugbear" in the whole situation has been the hoarding of the currency by those who demanded and obtained large premiums from employers of labor to meet their weekly pay rolls. Once these premiums are abolished the circulation should return to its normal condition, when there will be a superabundance of money to move the crops and set every wheel in motion.

Everything in the business world is in prime shape to start the new year with a rush. We congratulate *The Iron Age* on the good work it is doing, and wish it a happy and prosperous New Year.

Omaha.

LEE-GLASS-ANDREESEN HARDWARE COMPANY.—The season has now arrived when a let-up in the movement of goods is anticipated, a realization not unwelcome just now, as all the jobbing trade are very busy taking stock preparatory to closing their books and balancing results of the past year's traffic.

Taking the year 1907 throughout, it is conceded that for volume of business transactions it has been unequaled. It is expected that a season of comparative quiet in business circles will intervene between now and the opening of the spring campaign. This is customary. The general feeling of business men throughout the trans-Missouri region is one of uniform confidence, and the conviction prevails that all conditions point to a healthy spring trade as soon as the season opens.

The question of the future of values appears to be attracting some attention at this time. Opinions seem to be at variance on this subject. It is held by many that present values are likely to remain about where they are for some time, while others assert that a readjustment to a lower plane of prices for most commodities is near at hand. Conditions, however, are so excellent, not only in the West, but all over the country, that the recent monetary stringency could affect general business only for a very short time. It is even now a recollection.

With an easier money market, a lower cost of raw materials and possibly a reduction in cost of labor from the extreme high level figures would make the outlook for all industrial enterprises reasonably bright.

Baltimore.

CARLIN & FULTON.—It can hardly be disputed that the year 1907 has been in regard to trade the most remarkable in the history of this country. From January 1 to the end of October there was no abatement in the demand for goods, the immensity of which had made the record of the previous year phenomenal. Large harvests, good prices, busy factories, labor well employed, high wages, railroads taxed beyond their carrying capacity, all contribute to swell the volume of trade both foreign and domestic.

Suddenly came the chilling frost of suspicion as to the reality of stock values, and we to-day see the contrast in business activity resulting from that lack of confidence.

In spite, however, of the shrinkage of the market value of securities, the most of which continue to pay their usual dividends, the foundations of material prosperity were never stronger. Real estate has not depreciated in value. A large portion of this year's crops is still held by the farmers unsold. Farm mortgages have been greatly reduced and the average indebtedness of the individual is less than it has ever been, while the average circulation of money is greater per capita.

The country needs goods, for there is no accumulation of stocks anywhere. Production has been curtailed, and while there is a temporary decrease in the demand, the requirements for consumption are bound in a very short time to put business on its feet again. It is a noticeable fact that the manufacturing interests of the country are looking forward to the resumption of business activity, which they have not found necessary to stimulate by reduction in prices, and no doubt the average inventory of to-day will show values fully equal to if not higher than those of a year ago.

Stability in prices has marked the conduct of the Hardware business, and with its productions, which are necessary to every line of industry and not subject to the whims and uncertain demand of fashion, it is almost safe to predict that in a little while the demand for Hardware will inspire other lines and prove to be an object lesson as to the value of conservatism in prices by both manufacturers and the wholesale trade.

Our best wishes to our friends in the trade for a prosperous year.

NOTES ON PRICES.

Wire Nails.—It is the policy of the manufacturers to refrain from pushing Nails on the market, contenting themselves, so far as sales are concerned, in taking care of the few orders which come into them from the merchants to cover immediate requirements. This naturally tends to keep prices from being demoralized, and the market remains remarkably even. They are also taking advantage of the opportunity to get the mills in shape after the long and heavy pressure to which they have been subjected. In most cases, also, they are materially reducing production. There is, however, a willingness, especially on the part of the larger mills to accumulate goods to a reasonable, but not excessive, amount, so as to be ready to take care of the demand when it sets in. Under the conservative policy which is being pursued

and the good degree of harmony which prevails among the various manufacturers it is hoped, whether quotations are maintained at their present level or are somewhat lowered to correspond with changed conditions, that demoralizing irregularities in prices will be avoided. Quotations are unchanged, as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads, to jobbers	$2.05
Carload lots, to retail merchants	2.10

New York.—The demand is so limited that it is practically equivalent to no business at all. As a rule jobbers are wisely refraining from pressing Nails on the trade at cut prices, as this effort would not result in sales at this time and would only demoralize the market. Local jobbers and Nail houses are holding small lots at store at $2.30, base. This price is shaded by some sellers, while others are adhering to the above price.

Chicago.—New orders constitutes a very small part of the tonnage coming to the mills, the bulk of it being furnished by specifications against contracts. Shipments though greatly reduced in volume continue at a fair rate. The strongest feature of the situation is the fact that salesmen report stocks throughout the country to be light and an early improvement in demand is therefore looked for. Quotations are as follows: $2.23 in car lots to jobbers, and $2.28 in car lots to retailers, with an advance of 5 cents for less than car lots from mills.

Pittsburgh.—In present unsatisfactory conditions the Wire Nail mills are not trying to force sales, but are giving their efforts to keeping down output and sustaining prices, with very successful results. The mills are taking advantage of the present dull demand to shut down and make improvements, so as to be in as good shape as possible when the expected heavy spring demand starts. In the almost entire absence of buying prices are being well maintained by the mills, but are occasionally slightly shaded by some of the jobbers. Quotations on base sizes are as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads, to jobbers	$2.05
Carload lots, to retail merchants	2.10

Cut Nails.—The Cut Nail market continues to be characterized by a very moderate volume of business. Merchants have been buying during the past week only such Nails as they must have immediately, and the mills are wisely awaiting such orders as are sent them rather than attempting to force sales on an unresponsive market. There is not entire regularity in prices, and what might be called established quotations are slightly shaded. The regular price to jobbers is $2.05 base for carloads, f.o.b. Pittsburgh, with freight added to destination. Retail merchants should theoretically be charged 5 cents more, but this differential is not in all cases enforced.

New York.—Similar conditions rule in the local market in Cut Nails as in Wire Nails. Lack of consumptive demand is pronounced, and concessions in price are apparently no inducement to retailers to stock up at this season. Local jobbers and Nail houses are holding small lots at store at $2.30, base. This price is shaded by some sellers.

Chicago.—Coupled with other conditions tending to restrict trade, the general suspension of active work during the holiday week has operated to intensify existing dullness. There is practically no demand, but with a large portion of the mill capacity idle there is no attempt to crowd goods on an unwilling market. Prices are, therefore, generally well maintained on current business. Chicago quotations are as follows: Iron Cut Nails, carloads, to jobbers, $2.38; to retailers, $2.43; steel, to jobbers, in carloads, $2.28; to retailers, $2.33.

Pittsburgh.—Output of Cut Nails at present is very light, most of the mills being closed down to make repairs and improvements during the present dull demand. Some mills that are still in operation are inclined to shade prices to secure what little business is being offered. Prices named below continue to be shaded by some mills about 5 cents per keg. We quote Steel Cut Nails at $2 to $2.05, f.o.b. Pittsburgh, for carload lots, and small lots at $2.10, to which freight to destination is added. Iron Cut Nails are being held at about $2.15, at mill.

Barb Wire.—The fact that the farming population are, as a rule, prosperous and in admirable financial condition to purchase such commodities as they want encourages the expectation that there will be during the season a good demand for Barb Wire and for Wire Fencing. Since the financial trouble developed in October there have been a good many requests from merchants to the manufacturers, asking them to cancel orders or to defer shipments. There has, however, been within the past month less of this than heretofore, and a good many goods will be shipped early in the year. Quotations continue as before, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots	$2.20	$2.50
Retailers, carload lots	2.25	2.55
Retailers, less than carload lots	2.35	2.65

Chicago.—New orders have practically ceased, and the mills are clearing up shipments on existing contracts. Demand to cover the coming seasons requirements is expected to make its appearance soon, and orders from the Southwest should begin to come in early in January. We quote as follows: Jobbers, Chicago, car lots, Painted, $2.38; Galvanized, $2.68; to retailers, car lots, Painted, $2.43; Galvanized, $2.73; retailers, less than car lots, Painted, $2.55; Galvanized. $2.85; Staples, Bright, in car lots, $2.35; Galvanized, $2.65; car lots, to retailers, 10 cents extra, with an additional 5 cents for less than car lots.

Pittsburgh.—This trade is practically stagnant, there being no new demand while contracts have been pretty well cleaned up. The mills are taking advantage of the present situation to make needed repairs and improvements, and to make plans for the expected large volume in business when spring trade opens up. We are advised prices are being firmly held. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots	$2.20	$2.50
Retailers, carload lots	2.25	2.55
Retailers, less than carload lots	2.35	2.65

Plain Fence Wire.—The volume of new business is light, but there is apparently a better feeling with a probability that fairly liberal orders to the manufacturers may be expected within a few weeks. If financial conditions should call for economies on the part of the farmers, this will naturally diminish the amount of Fencing sold during the coming season, but those in close touch with the situation are anticipating at least a fair volume of trade. There is no complaint of irregularity in prices, but when there is enough business to test the market it will be seen to what extent it will be deemed feasible or desirable to maintain existing quotations, which are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots	$2.20	$2.50
Retailers, carload lots	2.25	2.55
Retailers, less than carload lots	2.35	2.65

Chicago.—It was scarcely expected that with radical change of conditions there would be any renewal of buying interest until after the turn of the year. Merchants and manufacturers are too busy just now with closing up the year's business to give a thought to forward requirements, but the coming weeks of January will probably see the movement of many postponed orders and the placing of new ones. Quotations are as follows: In car lots, to jobbers, $2.08, f.o.b. Chicago, and to retailers, $2.15.

Pittsburgh.—New demand is very light and specifications against contracts have in many cases been suspended, so that shipments by the mills at present are much lighter than for some time. It is expected that early in the new year conditions in the Plain Wire trade will show material improvement. Quotations for base numbers 6 to 9 are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carload lots	$1.90
Retailers, carload lots	1.95

Coes Wrenches.—The Coes Wrench Company, Worcester, Mass., for whom J. C. McCarty & Co., 21 Murray street, New York, and John H. Graham & Co., 113 Chambers street, New York, are agents, announce a revised list on their Bright Knife Handle and Hammer Handle Wrenches, and also a change in terms of sale. The change in list prices is to overcome an inequality in the old list under which the Bright Wrenches were selling at too low a figure as compared with the Black, the old list not representing the increased cost of manufacture. To correct this the list prices for the Bright Wrenches have been advanced so that the new list is as follows:

Knife Handle and Hammer Handle Bright Wrenches.

Inches.	Per dozen.	Inches.	Per dozen.
6	$11.50	15	$30.00
8	12.50	18	36.00
10	15.00	21	42.00
12	19.00		

These advances in list, in effect January 1, are referred to as very conservative, not quite covering the cost of polishing the goods. The company also announces that on and after January 1 all goods sold by it will be billed on the following terms: 3 per cent. for cash strictly within 10 days, or 60 days net. It is understood that these terms will be adhered to in all cases.

Blacksmiths' Aprons.—Following are the current discounts on Leather Aprons for blacksmiths, &c., quoted by the Richard Pick Mfg. Company, Chicago, for whom the Livingston Nail Company, 302-304 Broadway, New York, is Eastern sales agent: 1 dozen, 10 per cent.; 2 dozen, 15 per cent.; 3 dozen and over, 20 per cent.

Rope.—The first of the year finds Cordage manufacturers and jobbers devoting their energies to making collections. Some find this comparatively easy, while others are experiencing difficulty in securing prompt remittances. The latter condition hinges upon the fact that their customers have not been very successful in collecting accounts. Business seems to be practically at a standstill, and not much of a revival is anticipated during the present month. The following quotations fairly represent the market for base sizes: Pure Manila, 11½ cents; B quality grades down to 8½ to 9 cents; Pure Sisal, 8 cents; lower grades Sisal, 7 to 7¼ cents; No. 1 Jute, ¼-in. and up, 7½ cents; No. 2 Jute, 7 cents.

Window Glass.—The past week has recorded little new of interest in Window Glass affairs. There has been some difference of opinion between the Amalgamated Window Glass Workers' Association and the cutters' and flatteners' organization, which has prevented the latter making satisfactory arrangements with the manufacturers. It is now understood that a way out of the difficulty will probably be found. The product of the 400 to 500 pot capacity of hand operated factories now in operation is being offered, according to reports, at about 90 and 30 per cent. discount for single and 90 and 40 per cent. discount for double strength Glass. Business is light with jobbers. Prices recommended at the last meeting of the Eastern Window Glass Jobbers' Association are as follows: In the States of New York and New Jersey 90 and 15 per cent. discount for single and 90 and 20 per cent. discount for double strength Glass. Similar prices are supposed to prevail in Pennsylvania, but in New England discounts are said to be fixed at 90 and 20 per cent. for single and 90 and 25 per cent. discount for double strength Glass.

Linseed Oil.—The market has gained temporary firmness from the advance of Seed, and this in the face of an exceedingly light demand for Oil. Manipulation of the Seed market is apparently the only available explanation for this unusual condition. Demand is restricted to small lots for prompt delivery. Quotations are as follows: State and Western Raw, in five-barrel lots, 42 to 43 cents; City Raw, in like quantity, 45 cents, with 1 cent per gallon additional for less than five barrels. Boiled Oil is 1 cent advance on Raw Oil.

Spirits Turpentine.—Holiday dullness is reflected in the Turpentine market. The Southern market has declined during the week, and this has been reflected in values at this point, which has caused buyers to hold off buying until conditions become more settled. The New York market is represented by the following quotations: Oil Barrels, 43½ to 44 cents; Machine Made Barrels, 44 to 44½ cents.

INTERESTING SHOW WINDOWS.

THE window shown in Fig. 1 is one of a pair in the store of J. Russell & Co., Holyoke, Mass. The feature which instantly attracts the attention of the observer is the effective panel set in below the window proper which, at the time the photograph was taken, contained a display of Door Checks and other Builders' Hardware. The lower window is of course not accessible from the

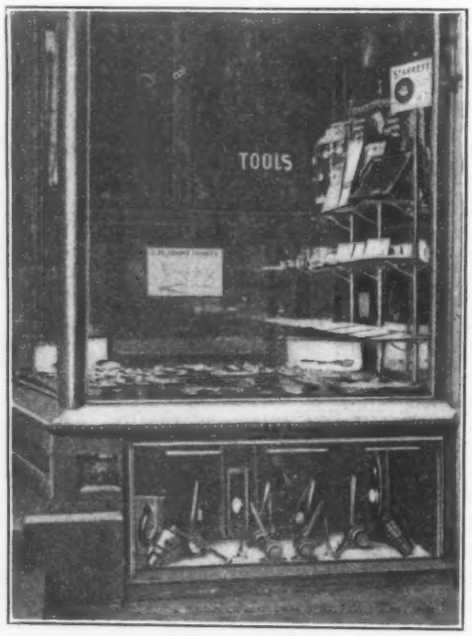

Fig. 1.—Portion of Store Front, Showing Panel Window Reached Through Basement.

main floor of the store, being reached through the basement, from which it is separated by an inclosed back to keep out dirt. Many merchants by making use of this clever idea could greatly increase the attractiveness of their store fronts, furnishing a setting for many effective displays of specialties, &c.

Above the panel will be observed the firm's Thanksgiving display of Carvers, &c., reproduced on a larger scale in Fig. 2. The layout was exceedingly attractive and

Fig. 2.—Thanksgiving Window of J. Russell & Co.

tastefully arranged. It will be noted that the window is inclosed with a mirror back which adds to the effectiveness of the display. There is also a mirror on the wall at the right with an adjustable frame for glass shelves on which goods may be prominently shown. At the left the window has a broad side glass adjoining the main entrance to the store.

SPECIAL SALES THE KEYNOTE TO WOMEN'S TRADE.

BY S. M. S.

HAVE you ever noticed how the dry goods and department stores frequently make a special sale of some popular household article in order to attract women's attention? The department store man fully knows that even though there isn't a cent of direct profit in it, and that he will in a great many cases sell at the cut price to a regular customer, who would, perhaps, willingly have bought the same article at a higher price, he knows from experience that he will also get in touch with some new and desirable customers whom he might never reach otherwise.

The Hardware merchant who is seeking women's trade can well afford to emulate this example of the department and dry goods stores, and even to greater advantage, in that the idea is more new in his case. The Hardwareman's customers are pretty much like other human beings. They have sympathies, feelings, warm blood, ambitions, and the desire to buy as cheap as possible.

Low and Cut Prices Are the Mighty Lever

that bring the crowd and start the special sale going. Bargains and more bargains are the fuel that keeps the steam up to the selling point and moves the goods. The special sale articles advertised as leaders or fliers must be cut in price. How deeply? As little as possible to save the dealer all the profit possible, yet as deeply as necessary to bring the crowd and attract buyers. Policy must, of course, determine just what goods are to be sold at a loss, what articles are to be sold at actual cost, and what goods are to be sold at a small profit. There should, however, always be enough goods sold at a profit, even during the special sale, to overbalance the loss on any goods sold as special sale bargains.

Offer Real Genuine Bargains.

In conducting a special sale, there must be real, genuine, attractive bargains, otherwise there will be no tremendous sale, only a small dash or splurge. Any useful, low priced article of known value will make a good special sale leader, but the value should be genuine, and furthermore, it must be such that the cut in price is easily recognized. For instance: A Coffee Pot or Dish Pan that usually sells for 50 cents, offered at 19 cents, will be a good leader in a special sale, provided the public knows that it is always sold at 50 cents, or can easily see that it is worth much more than the special sale advertised price. The special sale leaders should be sold at less than cost, or at best at actual cost. They are the bait with which to catch the public eye and to draw people into your store where they see the other goods you have on display.

Display Bargain Goods in Windows.

In the matter of displaying goods during a special sale—any goods advertised as leaders in the newspapers should be displayed in the show windows. And the special sale articles should be displayed at intervals all down through the store to the special sale counter, which should preferably be way in the rear somewhere. Then, while the crowd is waiting its turn at the special sale counter, they see many other things that interest them. Saturdays, Mondays and pay days make the best days for running a special sale.

Advertising the Sale.

In the matter of advertising a special sale, this should be on as large a scale as costs and the multitude of people you aim to reach will permit. Take all the newspaper space you can afford, have dodgers printed and distributed throughout the town, and even in the country for miles around, and remember, the greater number of people you invite to come, the more will come and the greater will be your store crowd. Put signs on your windows and your store front and do everything possible to create interest and enthusiasm in your special sale.

Experience of a Western Retailer.

Some of the most profitable and far reaching special sales have been those on which there was a direct money loss on the leader sold. I personally know of one small store in a Western State that appropriated $25 each week for a limited period to spend on special sales. Their first sale was on Coffee Pots. They bought 250 Coffee Pots and sold them at a special sale at a loss of 10 cents each. Their principal window was full of Coffee Pots, with the whole story on a big card, stating the number of Coffee Pots they had, the exact regular price, the cut price, and at what time the sale would begin. The purpose of the special sale was also stated: "To attract quick attention to the largest and lowest priced line of kitchen furnishings in the city." They had Coffee Pots on display at intervals in conspicuous places all through the store.

Women and More Women.

During the sale several hundred women lined up for Coffee Pots, and while they were waiting their turns saw many other things that interested them. Two hundred and fifty women bought Coffee Pots—the best Coffee Pot bargain they had ever seen; they also bought a lot of other things at regular prices and profits on their way out. These 250 women showed their Coffee Pot bargain to 500 other women, and $25 never bought more or better word-of-mouth advertising than did this amount invested in a Coffee Pot special sale. The Coffee Pots were bought low in the first place, and selling at an average of 10 cents each below actual cost made a most striking contrast between the regular price and the cut price. Women and more women came to that store who had never before been inside of its doors, and you may be sure they came again and willingly paid regular prices.

Any Hardware merchant can run a special sale. He can spend $25 or $100 just as he chooses. He can even sell at cost if he pleases and lose nothing. But the force that comes from advertising real bargains—bargains that everybody will have to acknowledge are such—the more and greater attention it will get, besides it helps to establish a reputation for low prices all along the line, and if you cut deeply—go well below cost—your competitors will not be so likely to follow you.

Some May Hold Up Hands in Horror

at this scheme for supplying at an actual money loss a demand that might be supplied at a profit. Some of you may forget that you couldn't possibly sell all those Coffee Pots at the regular price, because a good many of those women would ordinarily buy their Coffee Pots elsewhere without ever thinking of you in that connection. Perhaps some of you would rather give up that $25 for an ad. in a hotel directory, a theater programme, or in some of the many other places where it would soon be out of sight and out of mind.

Cost Not Heavy.

It doesn't cost much to try a special sale, and it is certainly attractive, and it works out on the profit side, because it wins women and their trade. Once you have tried a special sale you will need no further prodding to keep up the good work at regular intervals. You could not after that, be induced to give it up. This special sale plan would become a habit, a part of your business, and your women's trade would become a live, growing thing.

Anyway, isn't it high time for the Hardwareman to wake up and come into the main tent and make up his mind to go after the women's trade in real earnest. Hasn't he been content to be regarded as the concert after the big show long enough?

The Strike on the 3rd.

BY WESTMOUNT.

NOTICE.

In order that stock taking may be finished and everything straightened out by the end of the month, the management has found it necessary to ask the staff to put in some extra time.

Starting to-morrow evening, the warehouse will be open from 7 to 10 p.m. until further notice.

JAS. B. M'KIM,
Vice-President.

Supper money may be obtained from the cashier.

ON coming to work one cold miserable morning about the middle of November the employees of the Colonial Hardware Company were confronted with the above dispiriting intelligence from the powers that sit at the directors' table. It was pinned on the notice board at the warehouse entrance, beside the time clock, and gave no one the opportunity of staying off and pleading ignorance of the order as an excuse. A sudden icy feeling in the atmosphere had followed weeks of beautiful fall weather, when winter overcoats were the last things the boys had thought of, and this particular morning had found most of them unprepared for it. This didn't improve their tempers, and the remarks which were passed about the management were anything but complimentary to the dignified and portly gentlemen composing it.

The third floor staff were particularly bitter, as they had exerted themselves pretty hard, and in consequence their stock had nearly all been gone over and listed. Ned Burton, the manager of the floor, had a way all his own of getting the best out of his boys that there was in them, without making them think they were working unusually hard. He had kept them going steadily all through stock taking with the hope that his floor would be the first one finished, and just when his wish was about to be realized it riled him to have to come back at night to help out the other floors, where most of the staff had been loafing every chance they got. Besides, he had promised the boys that if they would "get a hustle on them" and keep the work up, he would see that they had no night work to put in.

Tom Lynch's Oration.

When he arrived at work this particular morning he found his boys holding an indignation meeting. Tom Lynch was occupying the floor and delivering quite an oration on the subject of "bosses" from the rather shaky elevation of a couple of cartridge boxes.

"Fellows, there's nothing in this giving in game. The more we do for 'Old Whiskers' the more he'll expect from us. He's all right and fair enough when you can convince him that he's in the wrong, but the trouble is to convince him. He won't give us a chance to state our case if we go to him.

"Haven't we worked like slaves for the last two weeks? Haven't we got our work in better shape than any of the other floors? You bet we have. We're not a bunch of knockers generally. When our own work's behind we come back and get it up without asking help from anybody. Last summer we didn't kick when we had to show up three nights in succession to get out that big Western order. We wouldn't be kicking now if our own work was behind, but you know as well as I do that the fellows on all the other floors have been loafing 'round half the time instead of working on the stock, and now we have to suffer with them.

"That's the question we want to settle right now. Are we going to lie down and let the boss walk over our faces, or are we going to stand up for our rights and speak out like free citizens? If we're going to kick we've got to do it in a way that will interest 'his nibs' so much in the matter that he will hear us out. We've also got to stand together. A couple of us would get fired if we opened our mouths, but if we all stick together they can't very well clean out the whole floor without holding over a lot of orders and putting the whole system on the bum.

"What's the verdict, get down on our knees to the powers or stick up for our rights? I'm in favor of fighting the whole thing to a finish now. All in favor? Good! Let's make our plans and have Ned see the boss about it as soon as possible, for from now on we're on strike."

An Ultimatum.

Ned had noticed that the boys were very much excited over the prospect of overtime, but had said nothing, expecting they would settle down to work as soon as they had blown off a little steam. He was rather surprised, therefore, to see them all coming toward him in a bunch.

"Come fellows. Let's get what orders we have on hand filled at once, so we can get at our stock. I want to have it all finished by to-morrow afternoon."

"Sorry, Ned," came from Tom Lynch, who had retained the position of spokesman, "but the staff of the 3d is on strike."

"On strike! Quit your fooling, fellows, and get to work. You've loafed enough this morning already."

"Nothing doing, Ned; we mean what we say. We understood from the way you talked that if we could get our stock finished within reasonable time you'd see that we had no overtime to put in. You saw the notice on the board this morning, and you know what that means. If the 'old man' says all departments are to come back he means it. We have decided that we have other things to do with our evenings besides coming down to this hole and helping a gang of loafers get their work done. If we come back we want to be paid for it, and paid well—time and a half—otherwise we don't come back. We have also decided that if we want anything from the 'old boy' we have to put him in a corner and help ourselves, as it's no use asking for it. He's always too busy to pay attention to what we say, and only wants us to get out and leave him to his correspondence.

"We want you to see 'his lordship,' explain to him that we don't think our constitutions will stand the strain of night work, and that we are at present resting up, while he changes his notice to read, 'With the exception of the third floor.' That will make him sit up and take notice, and you'll have a chance to say all you want to before he thinks of his letters again."

"Do you really mean it, boys? I think you are going a little fast. Hadn't you better think it over again? This may cost you your jobs."

"Jobs or no jobs, our terms are time and a half for night work, or no night work, and the sooner we know what he intends to do the better for all hands. Will you see him for us or will we go ourselves and storm his stronghold?"

"Oh, Lord! don't do that; you'll drive him crazy, and he'll never listen to you. I'll see him and do the best I can about it. In the meantime don't put the place on the bum. If I don't come back you'll know he's finished me for fair."

Delivering the Ultimatum.

Although Ned Burton often found it necessary to consult the vice-president on matters of business and felt more or less at his ease in the private sanctuary, his knees shook slightly as he approached the door on this particular occasion. His visit was a little out of the ordinary, and he knew that he would get all that was coming to him and a little bit more when the "chief" heard how some of the staff had decided to run things to suit themselves. However, he put on a bold front, and without waiting for the usual invitation to "Come in," which usually followed a knock on the door, he strode up and stood at attention beside the large flat top desk.

"Well, Burton, what can I do for you? Be as brief as possible, please, I'm exceedingly busy this morning."

"I'm sorry to trouble you, sir, but it's about the notice on the board this morning that I want to see you."

"Well, what about it? Can't you understand that I want the staff back here every night until stock taking is finished? I took pains to word my notice so that any person with half a knowledge of the English language would understand my meaning, and I'm surprised that a young man of your intelligence should, above all others, be the one to require a further explanation."

"I don't think there's any doubt, sir, that everybody in the warehouse understands the notice, but——"

"Well, Burton, if everybody understands it, why are you down here wasting my time as well as your own? Haven't you got anything to do upstairs?"

"Yes, sir, plenty; but the fact of the matter is my men have gone on strike."

"Gone on strike! Is that what you said, Burton? Have you been drinking, sir? Have you the cheek to come down here and tell me that a lot of young whippersnappers on your floor have the audacity, the downright cheek, to go on strike, to try and tell me and my directors what shall or shall not be done in this firm? Burton, you take my breath away, you make me—oh, Lord! Go upstairs at once, sir, at once, and tell every mother's son on the flat to get his money and get out. Understand me? Get out before noon."

"But, sir——"

"Don't but me, Burton. Do as I say or I'll include you with the rest of them."

Ned Burton has His Say.

"Mr. McKim, let me say a few words, please. If you'll listen to me for a few moments I don't think you'll regret it, sir. If you remember, at the time you put me in charge of the 3rd, you gave me many valuable hints about how to get along with the boys under me, and get them to work steadily without bullying them. You told me that a little kindness and diplomacy would get more out of a mule than any amount of thrashing, and that boys and mules were first cousins. I took your advice, and all the time I've been manager of that flat I've never had any trouble about keeping the work up to date. The boys are always ready and willing to come back at night if our orders get behind. When stock taking started I told them if they would have their stock finished first I would see to it that they wouldn't have to come back at night to help any of the other floors. Our stock will all be finished by to-morrow afternoon and our orders are up to date. The boys have been working so hard for two weeks now that it's got on their nerves. I came down to see you this morning to see if in consideration for what they have done you wouldn't change your mind in this case."

"Burton, you have been here long enough to know that what you ask is impossible. I can't make fish of one floor and flesh of another; anyway, you should not have taken it on yourself to make any rash promises."

"Well, sir, if you won't let them off, won't you arrange to have them paid overtime after 6 p.m.? They think that if they are docked for being absent they should be paid extra for night work."

"I'll do the thinking for this establishment, Burton. You go up and tell those insolent puppies that they are paid so much per week to do the work of this firm, and that the hours are from 8 o'clock in the morning until it's finished, if it takes until 11 every night. Now I hope we understand each other. Get upstairs and get things going. If those fellows won't obey orders fire them out."

"But, sir, think what a mess that will make of the floor. We are just in the middle of our Christmas orders, and if you discharge all the boys and put in a lot of green hands who don't know the stock the stuff will never go out in time."

"Why not, Burton? Don't you know the stock well enough to show the new fellows where things are?"

"Yes, sir, I know where things are, but if I'm supposed to be manager of a floor, I want to know that anything I do within reason will have your approval. I gave the boys my word that they would have no night work, expecting that you would sanction what I had done when I had explained my reasons for doing so to you. Instead of backing me up you want to discharge everybody on my flat because they try to make me keep my word. Under the circumstances, sir, I see nothing for me to do but resign with the rest of the bunch."

"I didn't think, Burton, that you were that spiteful. Do you think you are so valuable to me that your resigning will make any difference? Do you think I can't fill your place?"

"No, sir; I'm not trying to influence you by resigning, nor do I think you can't fill my place; but I can't go back to work and face the fellows under the circumstances. I never go back on my word."

"Burton, do you think under different circumstances you would stick up for me like you are sticking up for your boys?"

"Certainly, sir."

"Well, get back upstairs and tell them that I can't cancel their order for night work, but if they'll come back and help us out chances might be good for increasing some salaries about New Year's. I may also want a good, honest young fellow with a will of his own to assist one of the buyers. I'll consider you, as it's not safe to have you where you can make rash promises."

"Thanks——"

"Get out; I've letters to write!"

RETURN POSTAGE PROPOSITION.

THE RETURN POSTAGE ASSOCIATION, John A. Stewart, secretary, 35 Nassau street, New York, which was incorporated under the laws of the State of New York a few months since, has been organized for the purpose of establishing a system of postage by which the original senders of stamped addressed envelopes and postal cards shall be saved all expense for return postage, except where the return envelopes and postals are actually used in replies. This result is sought to be accomplished by a patented method, so guarded and regulated as to fully protect the Government from any possible loss. A deposit in cash of several hundred thousand dollars, it is proposed, shall be made with the postal authorities at Washington every week, based on the actual matter thus transmitted through postal channels as shown by daily reports from the post office authorities. Such a project would obviously be confined to general post offices in large cities.

The saving to manufacturers, merchants and others, if something can be done in this direction, would certainly be large, it being computed that of the prepaid addressed envelopes and postal cards sent out only about 10 per cent. are used for the purpose they are designed to serve. More than 70 per cent. of the postal cards and nearly a like proportion of the stamped envelopes sold last year, it is said, were used for circularizing, while not less than 75 per cent. of the money thus expended was a total loss. At the same time the postal revenue derived from actual return postage would probably be increased, once a practical working plan was found acceptable to the postal officials.

The idea of saving such postage is not new, such a proposal having been made at least as far back as the '80s, and many of the Postmasters-General have approved it. In the execution of this plan it is proposed to supply postal cards and envelopes of such form and color as to facilitate the separation of them from other mail matter, and bearing a printed address and subaddress, or one address with the legend conspicuously displayed, "Unmailable if address be altered."

DEATH OF MARTEN DOSCHER.

MARTEN DOSCHER, the active head of the Doscher Plane & Tool Company, Saugatuck, Conn., died at his home, in that town, December 26, of pneumonia, after a week's illness, aged 55 years. Mr. Doscher was born in New York and had been in the Hardware business since he was 16 years old, at first with Nathan Weed, who years ago was the New York representative of several Southern Hardware houses. Afterward he was the agent for G. W. Bradley's Sons and their well-known Edge Tools, Axes, &c. Then he began the manufacture of Wood Planes, Tool Handles, Mallets and kindred goods. Mr. Doscher was a man of excellent character and habits, and enjoyed the trust and respect of those who knew or dealt with him. His wife died during the past year and he leaves two daughters and one son.

The Cox Hardware Company, Paragould, Ark., having purchased the stock and fixtures of Edward Weber, Dexter, Mo., will conduct a general Hardware business at the former place.

NAIL AND WIRE MARKET IN 1907.

PRICES on Wire Nails, Barb and Plain Wire during the year just closed were remarkably even, as indicated by the accompanying table, which shows but one change and that an advance of $1 per ton, in the early part of September. Large orders were placed in the fall of 1906 in anticipation of an advance in price, which was announced in the early part of December. The impulse then given to the demand continued heavy up to October, when the trade was becoming convinced that conservatism in purchasing was the proper policy. Owing to the heavy demand there was little opportunity for the usual midsummer closing of mills for repairs. Prompt shipments were as a rule difficult to obtain during the greater part of the year, owing to the large volume of business, with premiums being paid for Nails in some instances for preferred shipments. Steel Cut Nails started the year 5 cents higher in price than Wire Nails, and in September were quoted at an advance of 10 cents. Orders placed during the early part of the year were phenomenally heavy, the demand exceeding the productive capacity of the mills. From September it was difficult to maintain the relatively higher price, owing to diminished demand, and the year closes with Cut and Wire Nails at about the same price, there having been, however, some inequality in Cut Nails. The curtailment of production in both Wire products and Cut Nails during the closing months of the year, and the conservative course pursued by the manufacturers has imparted a steadiness to the market which otherwise would not have characterized it. The beneficial influence of this conservatism has also been felt on the Hardware trade as a whole.

The following table gives the opening base prices (f.o.b. Pittsburgh, for car lots to jobbers) on Wire and Nails for 1907, together with the subsequent changes and dates when they went into effect:

	Wire nails.	Cut nails.	Painted barb wire.	Smooth fence wire.
January 3	$2.00	$2.05	$2.15	$1.85
August 1	2.00	2.10	2.15	1.85
September 3	2.05	2.15	2.20	1.90
October 3	2.05	2.10	2.20	1.90
October 31	2.05	2.05	2.20	1.90
November 21	2.05	2.00	2.20	1.90
December 26	2.05	2.05	2.20	1.90

THE CHICAGO HARDWARE MARKET IN 1907.

OUTLINED in bold relief against a background of more or less important market events comprising the record for 1907, and conspicuous by reason of its overshadowing prominence, is the striking contrast presented in a comparison of trade conditions existing at the opening and at the closing of the year. Continuing onward from an impetus gained in the preceding year, the volume of business early in the season attained such proportions that the manufacturing capacity in many lines proved inadequate to meet the demands. Factories were filled to overflowing with orders, and were unable to keep pace with the rising tide of business. Shipments were accordingly delayed and jobbers and retailers alike found it difficult to maintain stocks, and were on every hand beset by a clamoring demand for goods. Each succeeding month developed an increase in sales totals over the extraordinary high records established for the corresponding months of the previous year. This condition continued up to and beyond the midyear without abatement, and there was little diminution of business in the Hardware trade until September, when the effects of a growing financial stringency began to be felt. This movement culminated in November in a sudden and severe contraction of the currency supply, resulting in a sharp reaction, and all buying save for immediate and imperative needs was suspended, the year ending with business at an exceedingly low ebb. Fortunately, however, the preponderance of prosperity that characterized the business of the first 10 months outweighed the reversals of the remaining two, and the year as a whole can therefore be set down as one of profitable results.

No Demoralization in Prices.

Contrary to the usual experience in like periods of depression, the sudden slump in business was not accompanied by demoralization of prices. Freedom from the natural consequences that would have followed indiscriminate competition was mainly due to a remarkable unanimity of action between trade interests in refraining from pressing sales upon a weak and unwilling market. There was, in fact, no reason for a precipitate decline in most lines of finished Hardware, since prices had not been advanced in ratio with the cost of raw material; this being particularly true of cast iron and copper goods. Owing to the extreme high cost finally reached by ingot copper the prices of its products were necessarily advanced from time to time, and when a reaction, starting in August, culminated in a drop from around 26 cents to 13 cents at the close of the year, a revision of prices in copper wares and related lines became necessary.

Under the stimulus of continued prosperity, backed by the wonderful development throughout the West and Northwest, the Hardware jobbing interests represented by substantial and progressive houses in Milwaukee, Minneapolis, St. Paul, Duluth, Omaha, Sioux City, Des Moines, Kansas City and St. Louis have made rapid and permanent advances. During January and February, and even into March, trade movements in a large section of the Northwest were badly interfered with by a pronounced car shortage, which was further aggravated by blizzards and snow blockades. The stoppage of traffic thus occasioned was largely made up later by the rush of shipments that followed the lifting of these embargoes. The effects of car shortage were also felt to a greater or less extent elsewhere, and contributed not a little in adding to delay of factory shipments.

Building Operations in Chicago for 1907,

as represented by the cost of permits issued, reached a total of $59,094,180, as against the high mark set in 1906 of $64,247,330, the decrease amounting to $5,153,150. When it is considered that the building records of 1906 included four large structures which alone amounted to more than $8,000,000, it will be seen that in spite of unfavorable developments there is little to complain of in the volume of building business. But for the tightening of the money market, which arrested a large amount of building for which plans had already been completed, a new record would doubtless have been established in 1907. The character of building was not of a kind to create a large demand for high grade Builders' Hardware and these lines showed some falling off, but the large amount of factory, warehouse and apartment building undertaken furnished a satisfactory volume of business in medium grades.

Wire and Wire Products Eclipsed All Other Lines

in volume and insistence of demand from consuming interests. At no time during the year up until the middle of November were the mills fully caught up with their orders and able to ship promptly. It was not until the lack of currency made it impossible to move crops that business slackened up. After that time the mills began to receive orders for postponement of shipment because of either present or anticipated difficulty in meeting obligations.

Only one advance of 5 cents on Wire Nails took place during the year; no reduction was made when trade fell off in November and December. A similar advance on Cut Nails was made in August and was maintained with reasonable firmness, although business declined, so that in December a large part of the mill producing capacity was closed to prevent overproduction. The strength of the country at large was reflected in the urgent demand for Fencing Wire, which until toward the end of the year, when financial conditions were seriously disturbed, outstripped productive capacity.

Chicago as a Manufacturing Center.

Added to its established prestige as a distributing center, Chicago has made material gains in manufacture, and is rapidly taking rank as a producer of Hardware goods. Attracted by the superior market facilities af-

forded and the availability of an increasing supply and extended range of iron and steel materials, a number of new enterprises of this character have entered the field within the past 12 months. Influenced by the same causes, more such industries are expected to follow, thereby adding to the growing supremacy of Western manufacturing interests.

Outlook Far from Discouraging.

Despite recent reverses that have temporarily blocked forward progress, the outlook for the future is far from discouraging. And in no field of industrial activity are the indications of a more hopeful character than in the Hardware trade. Business is waiting a solution of the puzzling financial situation, the worst aspects of which have already yielded to remedial measures, and the restoration of normality seems to be gradually approaching. In reckoning with the possibilities of future demand there must be taken into account the vast resources of agricultural districts. These forces can be counted on to support the market by liberal purchases, and when an unrestricted money supply has effected the conversion of crops they will be felt in an increased demand for goods. If the phenomenal activity seen in the first half of 1907 is not realized in 1908, there is at least abundant reason to expect a satisfactory business for this period.

Chicago Wire Nail Prices, 1907.

The course of prices of carload lots at Chicago during 1907, and for several years preceding, is shown in the following table, the monthly prices being averaged from the weekly quotations contained in our market reports:

Month.	1907. $	1906. $	1905. $	1904. $	1903. $	1902. $	1901. $	1900. $
January	2.15	1.94	1.90	2.04	2.08	2.16	2.35	3.53
February	2.15	1.95	1.95	2.05	2.12½	2.20	2.45	3.53
March	2.15	1.95	1.95	2.09	2.20	2.20	2.45	3.53
April	2.15	1.95	1.95	2.10	2.15	2.20	2.45	3.28
May	2.15	1.95	1.95	2.10	2.15	2.20	2.45	2.53
June	2.18	1.95	1.95	2.07	2.15	2.20	2.45	2.48
July	2.18	1.95	1.95	2.05	2.15	2.20	2.45	2.43
August	2.18	1.95	1.87	1.90	2.15	2.20	2.45	2.43
September	2.23	1.96	1.87½	1.75	2.15	2.15	2.45	2.35
October	2.23	2.00	1.95	1.75	2.15	2.05	2.42½	2.35
November	2.23	2.04	1.95	1.77	2.15	2.00	2.35	2.35
December	2.23	2.15	1.95	1.78	2.00	2.00	2.35	2.35
Aver. for year.	2.18	1.98	1.93¼	1.97	2.13	2.14½	2.41	2.76

Chicago Cut Nail Prices, 1907.

The following are the Chicago prices for Cut Nails, car lots, during the year:

January	$2.30	July	$2.33
February	2.30	August	2.38
March	2.30	September	2.38
April	2.30	October	2.38
May	2.30	November	2.38
June	2.33	December	2.38

Average for 1907, $2.34; 1906, $1.96; 1905, $1.84; 1904, $1.84½; 1903, $2.33; 1902, $2.25; 1901, $2.34; 1900, $2.48.

Chicago Barb Wire Prices, 1907.

The course of prices of Galvanized Barb Wire in carload lots, Chicago, in 1907, and for several years preceding, averaged from weekly quotations, is as follows:

Month.	1907. $	1906. $	1905. $	1904. $	1903. $	1902. $	1901. $	1900. $
January	2.60	2.39	2.35	2.64	2.68	3.01	2.95	4.13
February	2.60	2.40	2.40	2.65	2.75	3.10	3.05	4.13
March	2.60	2.40	2.40	2.69	2.80	3.10	3.05	4.13
April	2.60	2.40	2.40	2.70	2.77	3.10	3.05	3.88
May	2.60	2.40	2.40	2.70	2.75	3.10	3.05	3.13
June	2.63	2.40	2.40	2.68	2.75	3.10	3.05	3.13
July	2.63	2.40	2.40	2.65	2.75	3.06	3.05	3.10
August	2.63	2.40	2.32	2.42½	2.75	3.00	3.05	3.10
September	2.68	2.41	2.32½	2.20	2.75	3.00	3.05	3.00
October	2.68	2.45	2.40	2.20	2.75	2.68	3.05	3.00
November	2.68	2.49	2.40	2.22½	2.75	2.60	3.05	3.00
December	2.68	2.60	2.40	2.33	2.60	2.60	3.00	3.00
Aver. for year.	2.64	2.43	2.38	2.51	2.93	2.93	3.04	3.39

C. J. Fitzsimmons has purchased the business of Smith & Weimer in Carleton, Neb., and will handle Shelf and Heavy Hardware, Stoves, Tinware, Agricultural Implements, Sporting and Athletic Goods.

RETAIL MERCHANTS GETTING TOGETHER.

BY HOOP IRON.

AT a recent national retail Hardware convention a delegate from one of the Western States was speaking on the subject of whether the word "dealer" or "merchant" should be used in the name of the association. He said that before the day of associations "junk dealers" would have been the most appropriate name for the Hardwaremen of his State, but now, since they have had a chance to get together, there had been such a slicking up of stocks, and change in the method of bookkeeping and system of doing business, that he thought they might call themselves "merchants."

We must not delude ourselves with the thought because we are doing business in 1907 that we are superior business men to our daddies of 50 years ago. Some of those old merchants who went to New York twice a year to buy goods were merchant princes beside some of the woodchuck dealers who never get but a few rods away from their holes.

The old-time merchant rubbed up against larger and better business heads during their trip and came home with broader ideas and better prepared to increase their prestige in business affairs.

In times of unusual conditions, for instance, like the present financial stringency, a Hardwareman wants to consult with Hardware men. He can read in his morning paper what Mr. Morgan, Mr. Cortelyou or Mr. Bryan says about the situation, which is good so far as it goes, but if he could get the ideas of half a dozen good, hustling Hardwaremen in nearby towns or cities, he can make up his mind much better just how to handle his business in his own town.

The getting together is an absolute necessity to those who desire and expect to better their business conditions, as well as make better citizens, and have a broader understanding of matters and men.

A HARDWARE FIRM'S SAVINGS COUNTING HOUSE.

THE enterprising Hardware house of Amiot, Lecours & Lariviere, Montreal, Canada, whose original and efficient methods have several times been referred to in these columns, has established what is known as "The Savings Counting House of the Staff." This is a scheme somewhat along profit sharing lines, which has been evolved with the idea of encouraging economy and thrift on the part of employees and at the same time stimulating a lively, personal interest in the welfare and progress of the firm. The following

Rules and Regulations

are quoted from a prospectus issued by the firm in which the exceptional opportunities offered to the members of its staff are described:

Those who wish to place their savings with the company will receive in making their first transaction an account book after having given their names, address and occupation.

Interest at the rate of 6 per cent. per annum will be paid to each one except where the money will not be in the hands of the company for at least 30 days.

Each year, on December 31, the interest will be figured out and placed to the credit of each one and will then bear interest. On no other date will the interest be figured out except for closing an account.

Any one having $100 to his credit will have the right by informing in writing the secretary of the company to place that amount in the Profit Sharing System herewith established, in proportion of the year's earning and pro rata for the time the amount will be in the company's hands. This will entitle the owner to participate in all the earnings of the company on the same basis as the capital stock of the company, and these net profits shall be placed to the credit of each one entitled to on February 1 each year, and will then bear interest.

A limit of $1000 is hereby fixed for each one except by permission of the Board of Directors.

Any one having $100 or more invested in the Profit Sharing System described in Article Four will have the privilege to be allotted stock in the company by making application to the secretary.

The company reserves itself the right to refuse to receive at any time funds from the staff for the account of the savings counting house, also the privilege to refund one, a few, or all those having amounts to their credits at any time but without prejudice to acquired rights and privileges.

THE OUTLOOK FOR BUSINESS

From the Retailers' Point of View.

THE business condition of the country is clearly reflected in the activity of the retail trade. The prosperity of individual manufacturers may be influenced by circumstances affecting only their peculiar and necessarily restricted lines; jobbers may experience a temporary slackening in the demand when the retail trade is going on with vigor, but the retailer, speaking generally, is the closest observer of consumption by which in the end both manufacturer and distributer must measure their operations.

With the object, therefore, of securing the most definite and accurate information obtainable regarding the outlook for the coming year, we have addressed letters of inquiry to a large number of representative retail merchants in all parts of the country. Their reports, here summarized and in a few instances quoted in condensed form, will afford our readers the most valuable data by which to gauge the present anomalous situation.

A Complex Problem.

In the first place, it is very generally conceded by our correspondents that the problem before the trade is one of the most perplexing that has ever presented itself. Some of them do not attempt to judge the future by the past, for the past affords no parallel. Their experience in former times of expansion and depression goes almost for naught. Conditions are observed which are not only complex, but distinctly contradictory. The prevailing uncertainty is well voiced by an able and prominent merchant in the Middle West, who writes:

Paradoxical Conditions.

It is the hardest time to figure on future trade that I have ever known. Our country is full of good crops, and farmers are well off. Factories are without orders, and are laying off men, working short time, and closing down entirely in some cases. Those who are working are frightened, and not spending any more than absolutely necessary. Our savings banks are taking advantage of requiring a six months' notice from depositors, and are calling in all call loans. Our business fell behind 12 per cent. in November, and up to December 15 was 26 per cent. behind the same period in 1906. Last week our cash sales were a trifle ahead of the corresponding days last year, which we attribute to the fact that people are buying useful presents instead of luxuries. Most of our stores who cater largely to the holiday trade have cut prices on this class of goods from 25 to 50 per cent.

Looks for Quiet Times.

I look for quiet times during January and February, and possibly longer. If we should get an early spring this would help some. As I said before, the country is rich, but every one is wondering what is going to happen next, and the outcome is hard to predict. I do not look for anything serious, but think it wise to go slow.

A similar view is expressed by a Nebraska house, which writes:

Political Uncertainty.

It is almost impossible to convey to you the uncertainty which exists in the mind of every thinking man as to what the future may develop. Conservative business men will limit their orders and watch their collections carefully during the coming year. The Presidential election will be a strong factor in business conditions, while the outcome of our 1908 crops will determine our local financial future. As yet business in our section has not suffered very much from the late financial flurry. Reports from over the State indicate that the volume of trade for November and December has been ahead of the corresponding months of 1906. The action of the banks in refusing to pay cash during the few weeks of the flurry has caused a feeling of bitterness in the minds of many depositors, and they will undoubtedly withdraw their money from circulation. We refer to the wage earner and the farmer; business men are banking the same as usual and indorse the action taken by the banks. It is a recognized fact that the Middle West is in the strongest possible condition to withstand a panic, yet our financial affairs are so closely connected with those of the East that we do not feel safe in our strength. We shall note with a great deal of interest the coming issue of *The Iron Age*, and we wish to congratulate the press of the country on the efforts they have made to inspire confidence in the minds of the people.

Middle West Well Fixed.

Diverging Views.

On the other hand, as would be expected where contradictory conditions exist, there is a wide divergence of opinion. An Ohio merchant expresses views in some respects almost directly opposite to those just quoted:

Ahead of Last Fall.

The year has been an unusually good one with me, much larger in most respects than ever before. I handle a great many Stoves, and the mild weather this fall has interfered with the Stove sales somewhat, but still, even considering the mild weather, my Stove business has been unusually large. In general Hardware, Cutlery, Sporting Goods, &c., the trade has been larger than usual and much more satisfactory as regards profits. The present month of December my sales are ahead of December, 1906. October, 1907, was the largest month's business I ever did. Conditions do not look very bad to me in the future, although I have no doubt there will be a curtailment in the spring.

Business Men Confident.

Just at present money matters are in the same condition as they are in other parts of the country, and there is a feeling of economy in the minds of all business people. Among my business friends I do not find as much fear expressed for the future as among bankers and professional men. There are a few more men out of employment at this time of the year in this city than heretofore, still general trade seems to be excellent in most lines.

An Illinois merchant also takes a hopeful view. He says:

No Complaint to Make.

So far our trade for the last three months is ahead of last year for the same months, and we have no complaint to make. We do look forward to rather a quiet trade in January and February—we hardly know how much longer—on account of partial shutdown of factories. We should say, as near as we can estimate it, that there are 25 per cent. of our mechanics out of work. However, we do not expect this to continue a great while.

Loss of Trade Only Temporary.

A Minnesota merchant argues that wholesalers and manufacturers are experiencing only a temporary loss of trade, due to retailers reducing stocks, which they are doing because they feel sure that prices will go no higher and may go lower. He sizes up the situation hopefully as follows:

Consumption Going On.

We see nothing to show unusual dullness ahead. Trade may not be up to the high record mark, but it will be far above the low record. In the agricultural sections like this, consumption is steadily going on. The lessening of the retailer's purchases is not because he isn't selling, but because he is thoroughly convinced that prices will be no higher, and may perhaps be lower. If this feeling should result in each retailer throughout the United States reducing his stock only $500, it is easy to see that the temporary loss in trade to jobbers and manufacturers would be a vast sum. Consumption may be curtailed to a certain extent, but whatever loss in trade is felt just now by the wholesaler and manufacturer is largely because of the conservative attitude of the retailers. As soon as the retailer is forced to begin buying, the effect of steady consumption in the meantime will become apparent.

Prosperity in Farming Communities.

As has already been brought out, nearly all agricultural sections are prosperous. Crops have been good and

the prices realized for them have been high. The farmers have money and are spending it, as is evidenced by many reports from different sections, extracts from which are given below:

FROM A MERCHANT IN MINNESOTA: Our community, being a farming one, I am not afraid of "Hard Times," nevertheless, I feel it the part of wisdom to be conservative, *i. e.*, expansions should be carefully considered, and all chances discounted. The only thing that makes hard times in a farming community is a total or partial crop failure. This we have not had.

No Danger of Hard Times.

The following cheerful note is sounded by a merchant in New York State:

Our business has been very good and the outlook for trade for the coming year is excellent. Our farmers are prosperous and all making good money. Help is the only thing that troubles us; it is very scarce and high. We believe the coming year will be better for us than the present closing one.

Scarcity of Help.

FROM AN OHIO HARDWARE HOUSE: Trade is almost normal with us. Our holiday sales have been quite up to the standard, and we have no complaints to offer regarding the year's business. Our community being dependent almost entirely upon the farming interests about us, we do not feel a slight depression at all. We believe that the outlook for business next year is very good.

Don't Feel Depression.

FROM A MERCHANT IN TENNESSEE: In reply to this will say that our trade, considering the depression in the money market, is good and the outlook as far as we can see is also good. People seem to have plenty of money and are trading quite freely.

Money Plenty.

FROM A MERCHANT IN MICHIGAN: We believe the outlook is good from the fact that the farmers have received good prices for their crops. Our customers are chiefly farmers, and they all seem to have plenty of money and are buying seasonable goods. While there has been no doubt some retrenching and more or less caution in the future in assuming new obligations, we have confidence in 1908 developing into at least a fair business year in the face of present conditions and Presidential year. Prosperity is more firmly intrenched, and we find a large percentage of our customers not deeply in debt, and have been able to meet their obligations when due during the fall and winter.

Confidence in 1908.

Financial Optimism.

The following letter from a merchant in the Northwest emphasises the financial strength of the farmers and of the banks of his section:

We were blessed with a good average of all crops, except corn, which did not get fully ripe. The prices for all farm products more than made good. Trade and collections were starting finely, when in the twinkling of an eye we "went bump." Trade will not recover its momentum as rapidly, but the outlook for the early future is most encouraging.

The farmers have the means; they can get an occasional man to work. The improvements prosperity (?) has delayed are greatly needed, and I believe will now be made.

While Eastern mortgage loaners have "put on the lid," and "call" the expirations, the man's *neighbors* have the money in bank, and are gleefully exchanging 4 per cent. for 7. In such a situation, how *can* we be pessimists?

Effects of the Financial Stringency.

In some agricultural districts, however, the effects of the November financial flurry have been more or less severely felt, and recovery has been slow. Many merchants suggest that if a moderate trade is enjoyed during the opening months of the year they will be more than satisfied. A well-known merchant in the Northwest differs from the writers of the letters just quoted. He says:

Business was very good in this vicinity until the Wall Street flurry broke in on us, and since then it has been different. An agricultural community would naturally feel such a financial depression quicker than any other, for the reason that prices of the products of the farm were the first to suffer in price. Farmers could not market their produce at all for a time, and since money has been obtainable for moving crops, there has been little desire to accept the lower prices. Some schemers have undoubtedly used these conditions as an excuse for hoarding. While sales have been as good, or ever better that might have been expected under the conditions, collections have been something fierce. Our people are hopeful that after the New Year prices will gain somewhat, and business, as well as collections, will pick up. At any rate, our customers have promised not to keep us waiting very long after January 1. I do not look for trade to increase enough after January 1 to make up for losses sustained during the past two months, but I do believe that January will be a better month than ordinary, by reason of the conditions that have prevailed for the past 60 days.

Farm Products Lower.

Improvement Expected.

The difficulty in marketing farm produce is also noted by a merchant in Wisconsin, who writes:

Our business up to about November 1 was exceptionally good. Since then we have felt the effect of the money flurry, especially since our farmers have been stopped, to a great extent, in marketing their produce. The past week, however, owing to the fine weather and the Christmas buying, our trade has assumed its natural proportions. The main manufacturing interests of our vicinity are paper and pulp mills. These mills are also feeling the effects of the markets and the lack of orders. Nearly all the mills have been closed down for from one to two and three weeks making repairs. We rather expect a quiet trade for the balance of the winter, but hope that by spring things generally will assume normal proportions.

Local Effects.

This is the way it looks in the cotton country:

Business was good this year up to the first of October, since which time it has steadily declined, and the prospects for the next month or two are anything but good. The St. Louis banks are still charging a premium on currency to move the cotton crop, and at the same time they claim that the panic is over. The farmers, that is, a great many of them, are holding their cotton for 15 cents, the price fixed early in the season. This makes business dull and collections very slow. We are not expecting very much business nefore next spring.

Premiums on Currency.

Criticism of the Banks.

In this letter may be detected a note of bitterness against the policy adopted by the banks, which is distinctively sounded by several others. Another merchant in the cotton district writes:

From the time that the banks quit paying, business has been dull, and the future outlook depends entirely on the resumption of payments by the banks. As soon as this is brought about we can look for a fair business.

A clear statement of one correspondent's view of the responsibility of the banks is also given in the following forecast:

We believe that the first half of 1908 will fall 25 per cent. below the sales in 1907. The last half of the year will depend entirely with us on how the Eastern banks handle their cash, and the cash they hold as reserve agents for the Western banks. Our trade this fall would have been normal if the Eastern banks had sent us the money due us. Prices on farm products are high and crops average good. In all farming communities where new settlers are coming in every year the demand for farm loans is great every year. When our banks have their cash tied up in the East they cannot loan, and therefore merchants must also curtail their sales. We believe, however, that 1908 will, in the end, turn out as good a year as 1907.

Depends on Banks.

Need of Cash.

From Manufacturing Sections

reports are not very encouraging. Owing to the scarcity of orders, mills and factories are being partially shut down, although some are trying to keep all hands

employed on reduced time. A few are courageously accumulating stock. A prominent Massachusetts house writes:

The outlook for trade in this particular section is not very encouraging for the next two months. Most of our factories are running on short time, and a good many are shut down entirely. There will be very little building, and the tight money market also adds to the trouble. We have an impression, however, that things will look brighter by the first of next year, and that business ought to commence to pick up during March and April.

A HOUSE IN PENNSYLVANIA SAYS: We are sorry to say that business in this section seems to be slowing up each day, and the outlook for the future in our opinion is not very promising.

Another Pennsylvania merchant writes as follows:

There has been a very serious falling off in the demand for coal in this vicinity, and the price has declined. The furnaces in this vicinity cannot find any market for their iron, but are still in blast, stocking their iron. The farmers are in a very prosperous condition, and to date local trade has held up well, but, all things considered, we look for a very quiet January and February. There seems to be great hesitancy on the part of the country merchant placing orders for futures, and their immediate requirements they are buying very conservatively.

No Market for Iron.

FROM A MERCHANT IN NEW YORK STATE: Indications point to but little activity in business for Hardware merchants in this section. We have little hopes of improvement before April, but believe that with the opening of spring business will be good.

FROM A MERCHANT IN NEW HAMPSHIRE: Present conditions in this vicinity indicate a falling off in business to quite an extent. Many manufacturers are running their plants under reduced hours or smaller forces; but in many cases we believe this condition to be owing to the financial stringency rather than to a shutting off of demand for goods. We are looking for a quiet season for the next two months, and for a year perhaps of comparatively quiet conditions after the season of high pressure of the past five years. We expect a dull season in building and extension of manufacturing plants.

More Encouraging Views,

however, are to be heard from the same sections, indicating that the outlook is not entirely devoid of hopeful features. One Massachusetts merchant says:

The situation locally is distinctly hopeful. Our mills as a rule have reduced their hours of labor instead of discharging help, so that while the help are receiving less pay, they are not entirely thrown out. The farmers and country stores are apparently prosperous, and the holiday business now going on, while less than a year ago, is still of fairly good proportions.

FROM A MERCHANT IN NEW YORK STATE: The panic in New York did not seem to affect us here very much. There was a little uneasiness for a few days, then business returned to its natural level. Our holiday trade is first class, and there is some building going on in the village, more than there was a year ago. This may be due to some distrust of the banks or to the fact that building material is slightly lower in price. There is about the same amount of work going on this winter, and our factories are all running full time with the usual amount of help. So far as we can see trade will be as good this winter as last or the year preceding.

A prominent merchant in the heart of the Connecticut manufacturing district takes a decidedly hopeful view. He says:

Up to the present time our retail trade has been quite satisfactory, and we have not felt the effect of the stringency in the money market to any great extent. The holiday business seemed a little slow in starting, but for the past day or two it seems to the writer that it is up to a normal condition.

Holiday Trade Normal.

Our manufacturers are taking a very conservative course, having reduced working hours quite materially and many of them shutting down for a longer period than usual for the holiday season. The effect of these short hours and shutting down is not felt by the retail trade suddenly; we will see the effect of this more when the spring season opens. It does not seem that we can experience extremely dull business, for the reason that, as I understand it, none of the manufacturers have any large stock of goods on hand. I think this is the condition of manufacturers throughout the country. This season of short money has had a tendency to curtail production, and I believe that this has been one of the best things that could have happened at this time.

Manufacturers' Stocks Small

Manufacturers everywhere have been unable to fill their orders and have increased their capacity seemingly to almost an absurd limit; we have all predicted a reaction sooner or later, and yet none of us seem to have been prepared for it. It seems to me that this lesson will put a stop to increase of production until another boom strikes the country.

Certainly the manufacturers of this country could not go on increasing their production as they have done during the past three or four years and find an outlet for the goods that this increase would produce, so that, as I have said, I feel that this is simply a condition that eventually had to come, and this probably was as good a time for it as any future time could have been.

Over Expansion Had to Cease.

THE TAYLOR INSTRUMENT COMPANIES.

THE TAYLOR INSTRUMENT COMPANIES, Rochester, N. Y., has lately been incorporated with a capital of $535,000. This corporation is the outgrowth of the Thermometer business established in 1851 by George Taylor, who retired temporarily from the business about 1859. About 1865 the business was revived by Frank Taylor and H. G. Richardson, under the name of Taylor & Richardson. In the early 70's, owing to ill health, Mr. Richardson retired and George Taylor and Frank Taylor became associated under the name of Taylor Brothers. Under this style the business was continued until 1890, when following the death of George Taylor it was incorporated as Taylor Brothers Company.

Since that time the Taylor Brothers Company has acquired the business of the Hohmann & Maurer Mfg. Company, manufacturer of Thermometers and Gauges for industrial purposes; Watertown Thermometer Company, manufacturing a general line of Commercial Thermometers and Thermometers for advertising purposes; Short & Mason, Ltd., of London, England, manufacturing Aneroid Barometers, Compasses, Recording Meteorological Instruments and Minor Surveying Instruments; the H. & M. Automatic Regulator Company, owning valuable patents on temperature and pressure regulation and control for domestic as well as industrial purposes, and the American branch of the Cambridge Scientific Instrument Company of Cambridge, England, manufacturing an extensive line of thermometric and other physical apparatus, mostly electrical, both for industrial and educational purposes.

The business thus founded by George Taylor more than fifty years ago, from manufacturing in a very small way the most ordinary types of Commercial Thermometers, now covers not only the entire field of commercial, industrial and scientific thermometric application, but meterological instruments of all kinds as well as an extensive line of surveying, engineering and scientific apparatus. The officers of the Taylor Instrument Companies are G. Elbert Taylor, president; J. Merton Taylor, vice-president; Herbert J. Winn, treasurer; Henry W. Kimmel, secretary, the directors being as follows: G. Elbert Taylor, J. Merton Taylor, Frank Taylor, Edward Bausch, Henry W. Maurer, H. J. Winn, Isaac Mayer, M. H. VanBergh and John W. Taylor. The company has branches in New York City, Chicago, Boston, St. Louis, Philadelphia, and London, England.

On January 1 D. L. Hamill, Buffalo, N. Y., jobber of Plumbers' Supplies, &c., was succeeded by D. L. Hamill Company, D. L. Hamill, president and treasurer, and Geo. Salzman, Jr., secretary. The business remains under the management which has conducted it successfully for more than a dozen years.

System for the Retailer.

Eighth Article.

DELIVERY OF GOODS.

BY JOHN A. MANSON, BURLINGTON, VT.

HANDLING orders to be delivered is one of the most important matters in the conduct of a business, for over half of the business of many merchants involves delivery of some kind—orders received by mail, orders received on the telephone and orders taken by salesmen and clerks—some of these orders are to be charged, some paid for and some to be paid for when delivered. Goods to be called for at some later time than when ordered should also be handled as delivery transactions. In addition, goods occasionally have to be credited to a customer, and the merchant is requested to call at the customer's for them. Now and then there is a no-charge transaction or a transaction that becomes void through non-ability to fill.

Some method to safeguard these varied transactions and insure prompt and definite results and prove that no goods are being delivered without having been charged or paid for, is most important in these days of sharp competition and close profits. Soon after starting in business I felt the need of some kind of register, follow-up and check-off, on all delivery transactions, something that would be thoroughly adaptable to a moderate sized business and prove that all delivery transactions were appearing in the charges and cash sales. Being unable to find on the market just what seemed neecssary, I finally developed, after considerable test and practical application, Manson's Delivery Record,* an idea of the arrangement of which is given herewith.

With this book in use all transactions can be followed up systematically—every entry is called to account and records are obtained showing that all delivery charges and cash sales have appeared in the charges and cash sales of the day. The object in indicating in "What" column the nature of the goods or the customer's order number is to identify that transaction. Should any question come up regarding the delivery of an order, reference to the book gives particulars. In many businesses more than one carter is employed who makes deliveries; under "Delivery" is noted who delivered, so that when carters' bills are brought in a check-up on each delivery is readily obtained. The book can be used to record any kind of delivery transaction that is apt to come up in store, shop or factory.

Referring to the illustrations, which represent broken away portions of one page of the book, the significance of the various headings will be seen. Under "Date" is noted the month and day; "Who" gives the customer's name; "What" the nature of the goods ordered; "Where" the place of delivery or place of business; "When" the time goods are wanted. The foregoing are the essential particulars regarding the entry of an order for delivery.

Under "Delivery" are the following divisions: "When," under which is noted the time of delivery; "How," the name of the carter, messenger or customer who took the goods, or if they were sent by freight, express or mail; "Checked By," the name of the person who checked the goods out of the place of business.

The orders of the day, those left by customers, those received by mail, telephone or telegraph, are at once entered, as shown in Fig. 1, and then handed out to be filled. It is suggested that in an ordinary business deliveries should be superintended and checked out by one person, who sees that the proper entries regarding deliveries are made and who uses the book as a follow-up on every transaction.

DATE	WHO	WHAT	WHERE	WHEN	DELIVERY			TRANSACTION	REVIEW CHECK
					WHEN	HOW	CHECKED BY		
May 25	H. E. Thomas	Tools	99 Hickok St.	9 A.M.				C.	
	Otter Lumber Co.	Order No. 5721	Mill	10 A.M.				b.	
	R. J. Jones	Roofing for Credit	16 Elm St.	to-day				R.	
	F. M. Godfrey	Machine Screws	86 Penn St.	ASAP				b.	
	Simons & Rand	Belting - due $6.25	J. B. & F.	to-day					
	Richards Mfg. Co.	Nails & Hangers	Shelburne Vt. 6 V fit	to-day				b.	

Fig. 1.—Delivery Record, Showing Entries.

DATE	WHO	WHAT	WHERE	WHEN	DELIVERY			TRANSACTION	REVIEW CHECK
					WHEN	HOW	CHECKED BY		
May 25	H. E. Thomas	Tools	99 Hickok St.	9 A.M.	9 A.M.	Lander	Prouty	C.	
	Otter Lumber Co.	Order No. 5721	Mill	10 A.M.	10 A.M.	Muir	Prouty	b.	
	R. J. Jones	Roofing for Credit	16 Elm St.	to-day	3 P.M.	Lander	Prouty	R.	
	F. M. Godfrey	Machine Screws	86 Penn St.	ASAP		Void.		V	
	Simons & Rand	Belting - due $6.25	J. B. & F.	to-day	4 P.M.	Simons	Prouty	C	
	Richards Mfg. Co.	Nails & Hangers	Shelburne Vt. 6 V fit	to-day	4 P.M.	Muir	Prouty	b.	

Fig. 2.—Delivery Record, Showing Entries and Deliveries.

DATE	WHO	WHAT	WHERE	WHEN	DELIVERY			TRANSACTION	REVIEW CHECK
					WHEN	HOW	CHECKED BY		
May 25	H. E. Thomas	Tools	99 Hickok St.	9 A.M.	9 A.M.	Lander	Prouty	C.	5/25
	Otter Lumber Co.	Order No. 5721	Mill	10 A.M.	10 A.M.	Muir	Prouty	b.	5/25
	R. J. Jones	Roofing for Credit	16 Elm St.	to-day	3 P.M.	Lander	Prouty	R.	5/25
	F. M. Godfrey	Machine Screws	86 Penn St.	ASAP		Void.		V	5/25
	Simons & Rand	Belting - due $6.25	J. B. & F.	to-day	4 P.M.	Simons	Prouty	C.	5/25
	Richards Mfg. Co.	Nails & Hangers.	Shelburne Vt. 6 V fit	to-day	4 P.M.	Muir	Prouty	b.	5/25

Fig. 3.—Delivery Record, Showing Transactions Checked in Full.

* Published by David Williams Company, 14-16 Park place, New York. Canvas cover, $1. Heavy manila cover, 50 cents.

In Fig. 2 the record shows the entries and deliveries. The key to the nature of the transaction is as follows: "C" stands for charges, "P" for payment, "R" for goods returned for credit, "N" for no charge, "V" for void, "F" for forward. The letters "T.B.C.F." are used in the "Where" column to indicate that goods are in the place of business and are to be called for.

The transactions checked in full for the day are shown in Fig. 3. The person who reviews the business of the day notes under "Review Check" the date when each transaction was verified with the day's charges and cash sales, or became void, or was disposed of, or was carried forward. In an ordinary business all orders not disposed of should be carried forward once a week.

Indiana Commercial Club Condemns Parcels Post.

THE Postmaster-General, having addressed a letter to the Commercial Club of Richmond, Ind., asking for its opinion of his proposed parcels post legislation, the club replied in part as follows:

There is a deficiency at the present time in the postal service each year of over $10,000,000. Under this proposed change this deficit would be greatly increased. The deficit as it is does not flatter the postal management, and to increase it for the benefit of a small number of traders in large cities would be the worst kind of class legislation.

Now as to the effect on the local retail merchant. The retail merchant does not care to do a mail order business. He does not carry a stock that can be catalogued successfully. His business depends on customers coming to his store. Mail orders to local merchants mean a credit business, whether the orders come by mail or by telephone, and a credit business of this kind is unsatisfactory, as every retailer in this city will verify.

Assortment Case of Coes Wrenches.

If the local retailer should go into the mail order business, and thus tend to keep trade from visiting his place of business, he would seek the low rent section of the city, and the appearance of our principal thoroughfare would be changed.

The saving to the local merchant in postage, as business is now conducted, would be very little. At the present time the rural carrier is allowed to deliver goods on his route with or without pay as he chooses. Under this new law all this is stopped.

The local merchant gets no benefit in obtaining supplies of goods for his own use, as this does not apply to wholesale quantities.

The wholesaler, and in most cases the manufacturer, depends upon the retail merchant. If he is successful, they are prosperous. If the retail merchant's business declines, the wholesaler shares in the depression.

The fact that the wholesale interests of the entire country are against the parcels post is evidence conclusive that it will be detrimental to the retail merchant, and the retail and wholesale interests are the life and backbone of the city.

We believe that any intelligent farmer who studies the full effect and meaning of domestic parcels post will condemn it. The wise farmer knows that his home market is his best friend. He knows that when his home town is filled with life and trade he shares in its prosperity.

The mail order houses have had unbounded prosperity in the past at a 16-cent mail rate. Now reduce this 25 per cent., or to 12 cents, and they will profit still more. A certain mail order house would save $40,000 a year alone on mailing their catalogues by this reduction.

Parcels post encourages long distance transactions, which is a condition that merchants in cities of our size and smaller have been trying to discourage as a matter of self-preservation.

Is there a demand for a domestic parcels post? If so, from what source?

The farmer is not demanding it. The laboring man is not demanding it. Practically every jobbing and manufacturing association of the United States is on record against it. Who have we left as being for it? The answer is plain.

It is the conviction of your committee that the passage of a domestic parcels post such as proposed would be detrimental to the business interests of our city, in that the disadvantages far outweigh the advantages of such proposed legislation.

It was accordingly resolved "that the Richmond Commercial Club is opposed to the passage of a Domestic Parcels Post measure, such as proposed by our Postmaster-General."

An Ingenious Holiday Greeting.

THE BERNARD GLOEKLER COMPANY, Pittsburgh, Pa., manufacturer of Refrigerators, Store Fixtures, Butchers' Supplies, &c., is extending the season's compliments to the trade by means of the clever design here reproduced, which is stamped on correspondence, &c. The device is ingeniously contrived so that a horseshoe, the recognized symbol of good luck, forms the letter C of the word compliments, in the familiar phrase "Compliments of the season." The original idea is such as to attract attention, and those who receive this kindly expression should be put in good humor by it.

The Coes Wrench Company's Assortment Case.

THE COES WRENCH COMPANY, Worcester, Mass., has found that an important factor in introducing its line of steel handle Star Model Screw wrenches to the trade is what is termed an Introduction Assortment Case, which is shown in the illustration. It goes to the retailer through the jobber only, and no merchant gets more than one case. The theory is that many houses would have had this Wrench before if there had been a way to get a starting stock. The contents of the case provide such a stock, for it contains five and one-third dozen Wrenches of assorted sizes. There are a dozen each of the 6, 8, 10 and 12 in. sizes; two-thirds dozen of 15-in., and one-third dozen each of 18 and 20 in. Wrenches. The case weighs 230 lb. gross, which covers minimum freight charges to any point. The merchant who receives the assortment is given an excellent opportunity to try the Wrench on his trade, and the Coes Company states that it is satisfied to abide by the results in their effect upon the retailer's future buying.

Price-Lists, Circulars, Etc.

Manufacturers in Hardware and related lines are requested to send us copies of catalogues, price-lists, &c., for our Catalogue Department in New York; and at the same time to call attention to any new goods or additions to their lines, of which appropriate mention will be made, besides the brief reference to the catalogue or price-list in this column.

SPECIALTY MFG. COMPANY, St. Anthony Park, Minn.: Catalogue illustrating Grass Catchers, Mechanics' Aprons, Hose Holder, Detachable Hose Rack, &c.

JOHNSON HARVESTER COMPANY, Batavia, N. Y.: Catalogue relating to Binders, Mowers, Steel Hay Tedders and Rakes, Reapers, Corn Binders, Disk Harrows, &c.

ECLIPSE REFRIGERATOR WORKS, Burlington, Vt.: Illustrated catalogue for 1908 of Eclipse Cleanable Refrigerators with removable ice chambers.

BUTLER BROS., Chicago: Midwinter edition of "Our Drummer" catalogue in which special attention is paid to Tinware, 5 and 10 cent goods and Hardware specialties.

BALDWIN REFRIGERATOR COMPANY, Burlington, Vt.: Large illustrated catalogue referring to an extensive line of domestic and grocers' Refrigerators, Ice Chests, Coolers, &c.

IMPERVIOUS PACKAGE COMPANY, Keene, N. H.: Illustrated price-list referring to Wood Drums, Kits, Kegs, Buckets, Oil Cans, &c.

AUSTRALIAN NOTES.

FROM OUR SPECIAL CORRESPONDENT.

MELBOURNE, November 25, 1907.

IT is doubtful if the general trade of any country in the world is so dependent on weather conditions as this continent, and in no other country in the world is the weather more erratic. When meteorology is a thoroughly understood science and when this science can be turned to commercial use, then Australia will come with a jump into the forefront of the nations.

The reason for its dependence on weather conditions is not far to seek, because its primary industries are wheat and wool. Its mining industry is also dependent on good average rainfalls inasmuch as without rainfall machinery in the back country cannot be driven and cattle for trucking die. For the past couple of months the weather has been the chief subject of talk out here as the spring rains have almost entirely failed. The past day or two has given us a slight rainfall over a large area, but a fall of several inches is required before the sun gets too hot.

The price of all cereals is pretty well doubled, and the railroads have got every available truck booked for weeks ahead for the purpose of shifting starving stock from one part of the country to the other. Shearing is in full swing in the northern States, and in spite of the increase in sheep it is expected that we shall have less wool. This is due to the fact that last year the fleece had a growth of 13 months with a good season, against one of 11 months this year with a poor season, and sheep are cutting on an average nearly a pound of wool less per head this year.

So far the weather can scarcely be said to have had a direct influence on the Hardware trade. Traders are, however, watching the situation pretty closely, and living in hope that even yet a general rainfall may come. If it does not orders will drop off pretty suddenly in the very near future. It may be a pessimistic outlook, but it is no use being optimistic in the face of hard facts.

Australia's Trade for 1906.

Financial statistics have recently been made available, showing that the total Australian trade (imports and exports) during 1906 amounted to £114,500,000 sterling, showing an increase of over £19,000,000 sterling, as compared with 1905. Of this £19,000,000, £6,000,000 were represented by imports and £13,000,000 exports. Iron and Hardware imports during 1906 totaled roughly £45,000,000, of which £26,000,000 were from the United Kingdom, less than £5,000,000 from America and £13,000,000 sterling from other countries.

Irrigation Works

are being pushed ahead rapidly, especially by the New South Wales Government. A huge dam is being erected by Barren Jack, which, when completed, will give one of the largest reservoirs in the world, calculated to hold considerably more than all the water in Sydney Harbor. The dam itself is to be built of red granite in 10-ton and 15-ton blocks. The hight from top to bottom will be about 240 ft., and it will be about 200 ft. in width at the bottom, narrowing to 20 ft. at the top.

New Hardware Clerks' Association.

The New South Wales Hardware Assistants' and Trade Association has recently been formed on the lines of the Victorian Association of a similar style. The Victorian organization has been in existence a good many years, has built up an institution on healthy lines, is in a sound financial position, and has admittedly been of vast benefit to the younger members of the trade in keeping them together, promoting friendly feeling, and securing positions for them. It works with the full cooperation of the employers, and has such enthusiastic backing that early in the coming year it will occupy very handsome clubrooms in Little Collins street, Melbourne, in the heart of the Hardware community of the city.

H. R. IVES COMPANY, Montreal, Canada, states that newspaper reports of the fire which lately took place on its premises were much exaggerated. The entire loss on building, machinery and stock was less than $12,000, of which but a comparatively small amount applied to machinery.

TREE BRAND CUTLERY.

HERMANN BOKER & CO., 101-103 Duane street, New York, manufacturers and importers of American, English, German and French Cutlery and Hardware, Steel and Metals, are giving particular attention to the marketing of their Tree Brand Cutlery, which, although but one of several important departments of their business, is one on which increased effort is being concentrated. Tree Brand Cutlery covers large assortments of Pocket Knives, Razors, Shears, Scissors, Manicure Articles and other Cutlery in solid dozens or fancy cases. The most active numbers are liberally stocked in New York and illustrated and described in their latest catalogue, which will be sent on application. The familiar brand, as here illustrated, has been sold in this market by Hermann Boker & Co. for more than half a century and long in the principal foreign markets of the world. The New York house of Hermann Boker & Co. was established in 1837, the brand itself symbolizing growth. H. Boker & Co. originated the Tree brand about 75 years ago, and ever since have owned and controlled it for high grade products, made both in Solingen, Germany, and at the American works. The trade in these goods has steadily increased, both in quantity and value, it being asserted that there is not a jobbing center where the goods are not known and dealt in.

It is conceded by Cutlery makers that the best process for making Pocket Knife Blades is by the old method of hand forging, as are all blades of this brand, thus producing uniformly high grade results. The essential characteristics of this brand in the various lines are quality and cutting edge, finish, patterns and price, the relative importance, from the manufacturers' standpoint, being in the order named. Tree Brand Cutlery is warranted to cut sharply and keenly and hold an edge with fair usage. All blades and similar parts are made of S. & C. Wardlow's Sheffield steel. The hardening and tempering of each blade is done singly and separately and similarly tested to detect flaws, while the various parts are frequently inspected during the numerous stages of manufacture. The manufacturers have assembled during the long years a community of skilled and experienced labor. Costly experiments have been made in improved methods of grinding to be discarded for that of hand grinding, than which no process as good has yet been developed, in this instance the house using the so-called "English system," employed also by the best known and most famous English cutlers. In forged blades the fiber of the steel is made homogeneous and tough, and from it a keen, lasting cutting edge is possible, it being an accepted fact that the finest tools are hand forged.

Staple, special and fancy patterns and new models are added liberally every year, and the product is sold under full warranty. The sales last year, we are informed, aggregated several hundreds of thousands of dollars in this market, on which all claims of dissatisfaction totaled less than $700, and of the latter amount an actual inspection and test showed that more than 60 per cent. of the value claimed was for Knives abused or worn out.

FOLLOWING its usual custom, Sickels, Preston & Nutting Company, Davenport, Iowa, has recognized the holiday season by sending to its friends and patrons a handsome brochure containing six modern paintings effectively reproduced by color photography. The pictures are each mounted on a large mat and are entirely suitable for framing, although making a very pleasing collection in the form in which they are distributed.

Hardware Store Conferences.

CHANDLER & BARBER, Boston, Mass., make a feature of monthly conferences with their principal salesmen and endeavor to introduce some new subject or revive some of the older matters which have been allowed to lapse and which need brushing up. Occasionally it is found desirable to invite a specialist on a certain line and give up nearly a whole evening to that one subject. Some time since, for example, Mr. Leeds, connected with the Russell & Erwin Mfg. Company, New Britain, Conn., delivered an interesting talk on the subject of Door Checks and Unit Locks, dwelling on the mechanical features and the various reasons for their adoption, and illustrating by means of the goods properly arranged for this purpose. This information is especially valuable, as it enables the store salesmen to talk intelligently on the subject.

These meetings are also taken advantage of to call attention to certain lines of goods which need to be moved and to discuss with the salesmen the best means for disposing of them. In fact, all of their work is gone over, not in the spirit of criticism, but in a friendly conference of employers with employees as to the ways and means of best conducting business, the employers urging upon each of their employees to be ready to give suggestions. The spirit of mutual helpfulness is a large factor in conferences of this sort.

Occasionally time is taken to go out to supper, but generally it has been found more satisfactory to the employees to go out and get a light collation and get back within a short time, so as not to make the conference a late one, the deliberations usually ending at 8.30 or 9 p.m. Where it has been advisable to ask all the employees to stay the firm has found that a few minutes right after the closing time, usually not over 15 minutes, has been sufficient.

Importers' Automobile Salon.

THE fourth annual automobile exhibition of the Importers' Automobile Salon, Inc., opened Saturday evening, December 28, in the Madison Square Garden, New York City, and will continue until January 4. This handsome display is strictly one of fine foreign motor cars for many purposes, but in the accessories there are some domestic exhibits. The decorative scheme includes a tunnel-like archway, with Louis Quinze decorations and Pals' famous conception of the "Spirit of Speed." There is also a long colonnade reaching across the Madison avenue end, a central figure or group of four figures at each corner of a pedestal, surrounding which is a plastic representation of the "Spirit of Speed," together with a fountain in a basin 30 ft. in diameter. The Garden arena has been transformed into a Parisian Boulevard scene. The signs bearing the names of the automobiles are internally lighted by electricity, artistic drapery dividing the numerous exhibits. New Year's Eve and New Year's Day were signalized by some unique features, the most noteworthy being a spectacular carnival, in which oxen, Hindoos carrying a palanquin, Japanese using a jinrikisha, Egyptians, Romans and Greeks in their chariots drawn by horses, Medes and Persians using elephants for locomotion and transportation, participated. The age of steam was represented by an engine, followed by bicycles, and, finally, the triumph of modern genius in the field of locomotion and transportation—the automobile.

The Lefever Arms Company.

THE LEFEVER ARMS COMPANY, Syracuse, N. Y., has announced its 1908 schedule of retail selling prices, the purpose of which is to insure a satisfactory profit to the merchant on the company's line of high grade Guns. The sale of these Guns is confined to Hardware jobbers and retailers and Sporting Goods houses, orders from catalogue and mail order concerns not being accepted. That the effort to insure satisfaction on the part of the trade from handling its product is appreciated is referred to as evident from the fact that the company's business has increased to such an extent during the past year or two as to necessitate the erection of a large addition to the plant, which is now under construction. A large amount of machinery of the most approved type is also being installed.

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NEWHOUSE GAME TRAPS.

THE name of Sewall Newhouse is linked with the manufacture of Game and Animal Traps the world over, and he is known as the pioneer in the origin and production of devices for catching game, whether for food, pelts or protection from attacks of dangerous beasts, ranging in capacity from bear and larger game to pests, such as gophers and rats. As the trade knows, the making of Traps for hunters was the first attempt at manufacturing by the Oneida Community, established at Oneida, in central New York, in 1848, expanding with time until factories were also built at Sherrill and Niagara Falls, N. Y., and Niagara Falls, Canada, turning out in addition silver plated ware, sewing silks and canned goods, but it is with Traps, Chains and similar accessories that this article is concerned.

The Indians and bushmen were not without skill in trapping, though their implements were necessarily crude. The old-fashioned "tree fall" was one of the earliest devices, and it felled an animal as with a bludgeon. In those days furs were regarded more as a necessity than as a luxury. Farmers had long hauls to market in zero weather. They went bundled in rough furs set together more for comfort than fashion. It is the same way in Canada to-day with lumbermen, farmers, teamsters, &c. It was under such primitive conditions that in 1848 the Oneida Community undertook to reclaim a wilderness in central New York. Led by John Humphrey Noyes, they settled on the old Indian reserve, now Kenwood, near Oneida. These pioneers were largely rugged New England farmers and mechanics, who had inherited force of character, strict integrity and a certain hardihood and grim determination from their Puritan forefathers. Conspicuous among them was Sewall Newhouse, one of those ingenious and inventive souls whose fertility of resource enable them to adapt themselves to any surroundings. To his gifts as a trapper and hunter was added rare mechanical skill.

It happened that there was a rude blacksmith's forge on the land secured by the Oneida Community. It was found there, so that by happy coincidence there was a "forge for Newhouse and a Newhouse for the forge." It was at this forge that Sewall Newhouse laboriously hammered out his first Steel Traps by hand. It was noticed that they had a relentless grip. They did not lose their tenacity from use or exposure to the elements. Indeed, one of those old, original, hand forged Newhouse Traps was recently found in an out of the way region where it had lain for many years forgotten; but the spring and the snap were still there ready for use, in spite of grime and surface rust. The first demand for these Traps naturally came from the immediate neighborhood. The Indians and farmers' boys used to come and beg or barter for the Traps when they could not pay in money. Wild and dangerous game rendered the Traps a protective necessity, aside from considerations of sport or trade; and professional trappers were quick to appreciate the build and mechanism of the Traps. They gradually found their way into the stores, and additional forges had to be set up to keep pace with the demand. Mr. Newhouse broke in the young men of the Community, teaching them how to make the Traps; so that he soon had a corps of efficient assistants. Large orders began to come in from important customers, including the famous Hudson Bay Company, with its great trade in furs.

The growth of the demand necessitated the introduction of machinery; the business had outgrown the limitations of manual labor. Machinery gave great impetus to the output. Traps were soon turned out in seven sizes by the thousand dozens. The addition of further machinery from time to time was simply a matter of detail. A point that is interesting to note is that the greater part of this machinery was invented on the spot by the Community's own men. The output of the factory now reaches the figure of about 4,000,000 game Traps a year.

THE wholesale Hardware stock of McVoy, Wessling & Co., 74-76 West Lake street, Chicago, was badly damaged by fire on December 26, the loss entailed being estimated at $100,000. Although not entirely consumed by flames the unburned contents of the building were all more or less injured by smoke and water. Temporary quarters were immediately secured at 22 East Lake street, where the company's offices are now established. Business will be conducted at this location pending the adjustment of the loss and the installation of a new stock. Whether the business will be continued at the former site has not been determined, but in any case will be resumed with as little delay as possible, either there or in new quarters.

FOREST, FISH AND GAME SOCIETY'S EXHIBITION.

THE first annual Forest, Fish, Game and Sportsmen's Exhibition, under the auspices of the Forest, Fish and Game Society of America, opened December 23 in the Grand Central Palace, New York City, and will continue until January 4. There are many features that make it distinctively a sportsmen's show, characteristics that are designed to be permanent. There are exhibits of wild game animals in cages from bears to lynxes, beautiful pheasants, &c., numerous specimens of water fowl, including ducks, geese, swans, ibises, &c., game fish, both in the large open tank shared with the water fowl and beaver and fish in transparent glass tanks, together with trout and other fish eggs in various stages of development. There are innumerable fine exhibits of forest scenes of an educational character photographed on large sheets of glass, the effects of which are brought out both by artificial and natural light, showing approved methods of forestry, clearing up and burning brush scientifically, the planting of trees, correct lumbering methods, &c., with a view to inculcating correct knowledge as to the propagation and preservation of forest preserves. In the art rooms are examples of animal life in oil and water-color by Rosa Bonheur and others, photographs of game, specimens of taxidermy, a generous display of Arctic Club flags carried by Peary, Wellman and others, studies in oil of Arctic scenes, boats and sun dials built in the Arctic regions and many other kindred displays. The frequent programmes of moving pictures at half hour intervals, both afternoon and evening in the main auditorium, which can be seen from both sides of the three floors, depict hunting scenes of domestic and foreign character, even to hunting elephants in India, as caught by amateur photographers on numerous expensive jaunts. They all have an educational value, some of the subjects being tuna fishing, quail shooting, uses of the dog, caribou and moose hunts, ostrich and broncho training, tarpon fishing, &c.

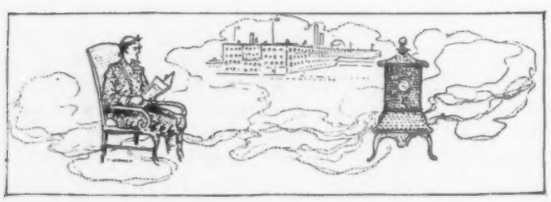
Some exhibits are given under the auspices of the Audubon Society for the protection of wild birds and animals, and the New York Zoological Society, and there is a school boy rifle shooting tournament supervised by the National Rifle Association of America and the Public Schools Athletic League of New York for individual and team shooting under United States Government regulations, using army rifles and open to all school boys 18 years old or under. In this connection there is an extensive exhibit of rifles and arms by the National Government; also the Palma international rifle trophy, first won by the United States team in 1876 at Creedmoor and last at Ottawa in 1907, a large bronze tablet given by the United States Congress for rifle shooting and several other trophies. In the shooting contest the prizes include "junior marksmen's" medals, authorized by the Secretary of War, a Winchester cup for school boy teams, a U. M. C. challenge cup, a Remington rifle, Winchester musket, Hopkins & Allen rifle, Stevens gallery rifle and a piece of statuary for an intercollegiate match. The contributors of prizes and ammunition include the Winchester Repeating Arms Company, Union Metallic Cartridge Company, J. Stevens Arms & Tool Company, Remington Arms Company, Hopkins & Allen Arms Company, E. I. Du Pont de Nemours Powder Company and Peters Cartridge Company.

A Deserted Village

Copyright, 1907, by THE IRON AGE.

Tom Plowman lived on a section farm
Not far from a prosperous village;
He worked late and early and calloused his palm
But thrived by industrious tillage.

He saved up some money and stood very well,
His luck would have lasted for all we can tell
If he never had heard of Chicago.



One day a big catalogue came through the mail
That told of a wonderful heater;
The figures were tempting, Tom swallowed the tale,
Says he, "Mr. Merchant's a cheater.

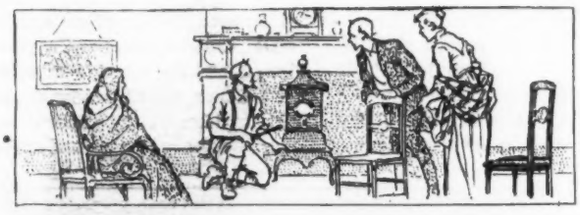
His profit must be near a hundred per cent.,
I'll just call his bluff and unless he'll relent
I'll order a stove from Chicago."

So he drove to the village and entered the store
With an air that was lofty and knowing.
Says he, "Mr. Merchant, please tell me once more
The price of that stove you were showing."

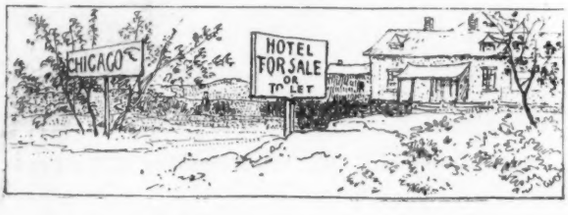
"Thirty-five, cash or credit, the best one in town."
Tom turned on his heel and went out with a frown,
And sent off a check to Chicago.

He bragged to his neighbors and they in a trice
Sent away for whatever they needed;
They often were stuck, but they got a low price,
Which, of course, was the one thing they heeded.

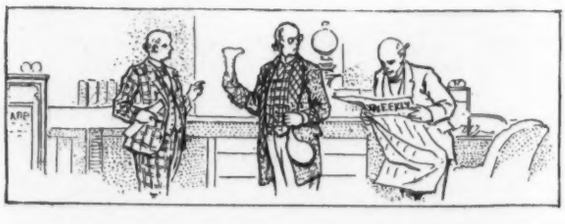
The merchant soon failed and sold out his store,
And this was the notice he left on his door:
"Gone to look for a job in Chicago."



Tom's mail order stove didn't work very long,
But no one in town could repair it;
At last he was forced to admit he was wrong,
His neighbors weren't slow to declare it.



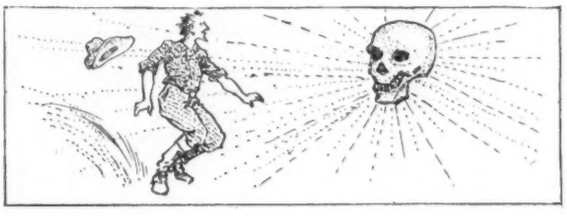
With no stores there was no one to buy or to sell,
The drummers stopped coming, they closed the hotel,
'Twas surprising how quickly the town went to—well
A very long way from Chicago.



The lawyer, the doctor, the editor, too,
They all got cold feet very quickly;
The parson soon noticed the way the wind blew,
He left, for his children were sickly.

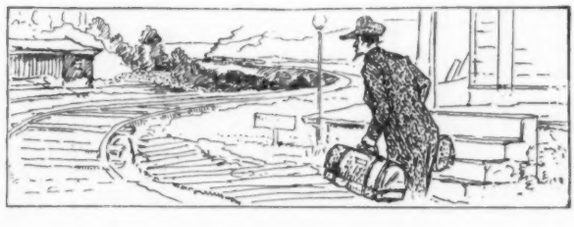
At last Tom decided to sell his old farm,
But no one, he found with the greatest alarm,
Would buy one so far from Chicago.

When blank desolation stared Tom in the face
His courage grew weaker and weaker,
Till he made up his mind to get out of the place
And go on a jaunt as home seeker.

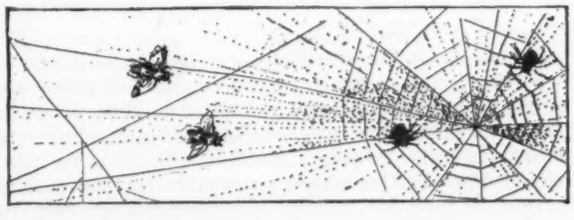


So he put on his overcoat, packed up his grip,
Says he, "I'll be giving my neighbors the slip
For I must be off to Chicago."

When he got to the station to Tom's great surprise
He found it deserted and dusty,
Inhabited only by spiders and flies,
And the siding was crooked and rusty.



The trains flew by whizzing, Tom waited in vain,—
Says he "Neither merchant nor doctor nor train
Will stop any place but Chicago."



THE KNAPP-CRAMER HARDWARE COMPANY'S STORE.

AN attractive and conveniently arranged store is that of the Knapp-Cramer Hardware Company, located in North Tonawanda, N. Y. The store is 32 x 85 ft. in size, two stories and basement, there being three warehouses in the rear, where surplus stock is stored. The hight of the first floor ceiling is 12 ft. By referring to Fig. 1 it will be seen that the entrance is to one side of

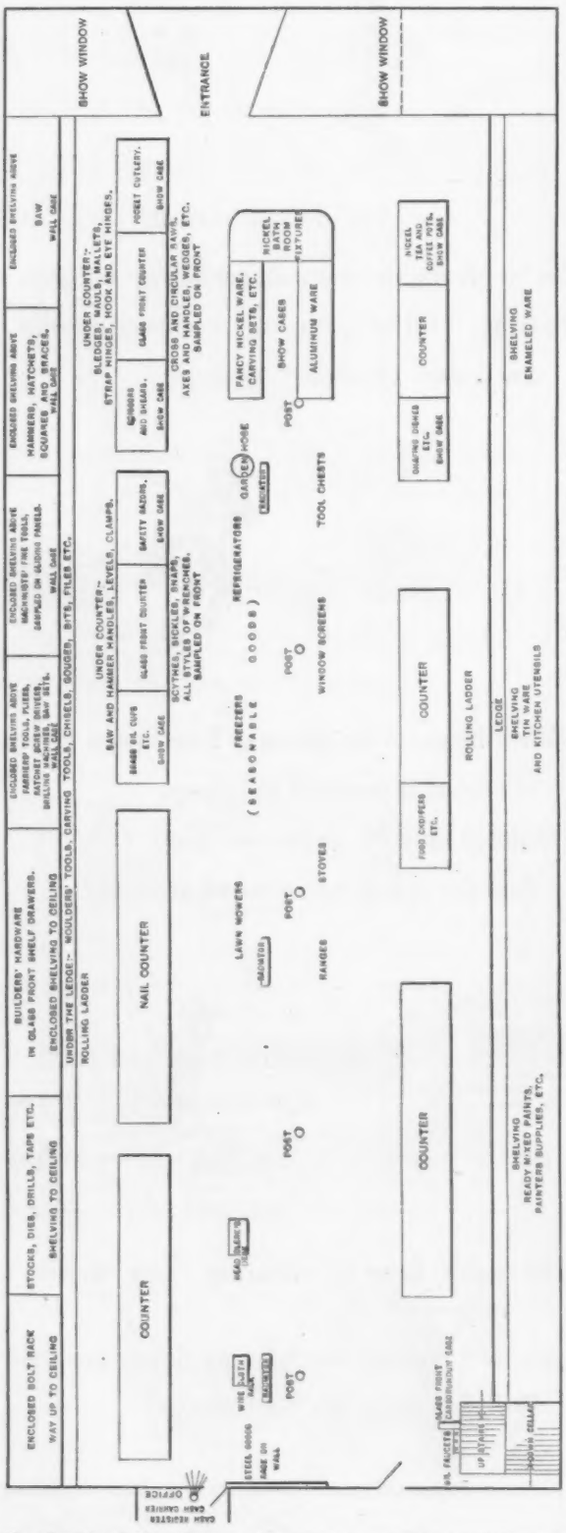

SHOW WINDOW
ENTRANCE
SHOW WINDOW
ENCLOSED BOLT RACK WAY UP TO CEILING
STOCKS, DIES, DRILLS, TAPS ETC. SHELVING TO CEILING
BUILDERS' HARDWARE IN GLASS FRONT SHELF DRAWERS. ENCLOSED SHELVING TO CEILING
ENCLOSED SHELVING ABOVE FARRIERS' TOOLS, PLIERS, RATCHET BRACE DRIVERS, DRILLING MACHINE, SAW SETS. WALL CASE
ENCLOSED SHELVING ABOVE MACHINISTS' FINE TOOLS, GROUPED ON SLIDING PANELS. WALL CASE
ENCLOSED SHELVING ABOVE HAMMERS, HATCHETS, SQUARES, AND BRACES. WALL CASE
ENCLOSED SHELVING ABOVE SAW WALL CASE
UNDER THE LEDGE— MOULDERS' TOOLS, CARVING TOOLS, CHISELS, GOUGES, BITS, FILES ETC.
ROLLING LADDER
COUNTER
NAIL COUNTER
UNDER COUNTER— SAW AND HAMMER HANDLES, LEVELS, CLAMPS.
GLASS CO. CUTS ETC. SHOW CASE
GLASS FRONT COUNTER
SAFETY RAZORS. SHOW CASE
SCYTHES, SICKLES, SNAPS, ALL STYLES OF WRENCHES, SAMPLED ON FRONT
UNDER COUNTER— BLEDGES, MAULS, MALLETS, STRAP HINGES, HOOK AND EYE HINGES.
RAZORS AND SHEARS. SHOW CASE
GLASS FRONT COUNTER
POCKET CUTLERY. SHOW CASE
CROSS AND CIRCULAR RASPS, AXES AND HANDLES, WEDGES, ETC. SAMPLED ON FRONT
FANCY NICKEL WARE, CARVING SETS, ETC.
SHOW CASES
NICKEL BATH ROOM FIXTURES
ALUMINUM WARE
POST
LAWN MOWERS
FREEZERS (SEASONABLE GOODS)
REFRIGERATORS
GARDEN HOSE
TRICYCLES
TOOL CHESTS
WINDOW SCREENS
RANGES
STOVES
POST
POST
COUNTER
FOOD CHOPPERS ETC.
ROLLING LADDER
LEDGE
SHELVING TIN WARE AND KITCHEN UTENSILS
SHAVING DISHES ETC. SHOW CASE
COUNTER
NICKEL TEA AND COFFEE POTS. SHOW CASE
SHELVING ENAMELED WARE
COUNTER
SHELVING READY MIXED PAINTS, PAINTERS SUPPLIES, ETC.
HEAD LIGHTS SHOW CASE
WIRE GOODS AND CHAINS
ENCLOSED
POST
STEEL GOODS MADE ON WALL
HARD FINISH CARDBOARD CASE
SM. FAUCETS ETC.
UP STAIRS
HOUSE CELLAR
OFFICE
CASH REGISTER
CASH CARRIER

Fig. 1.—Floor Plan of the Knapp-Cramer Hardware Company's Store.

the front of the store and opposite one of the aisles, extending the entire depth of the room. Along this side of the store are wall cases, with sliding glass doors, devoted to mechanics' and machinists' tools. Following these are shelf drawers containing miscellaneous Hardware. The shelving above the wall cases and drawers extends to the metal ceiling, and is divided into compartments, with enclosed fronts upon which such goods as Breast Drills, Hack Saw Frames, Tacks, Wire Goods, Thermometers, small Chain, Dog Collars, Lumber Crayons, &c., are sampled. This entire side of the store is sampled behind glass fronts. Rolling ladders afford ready access to the shelving. From Fig. 1 an idea of the general arrangement of goods may be had, both above and under the

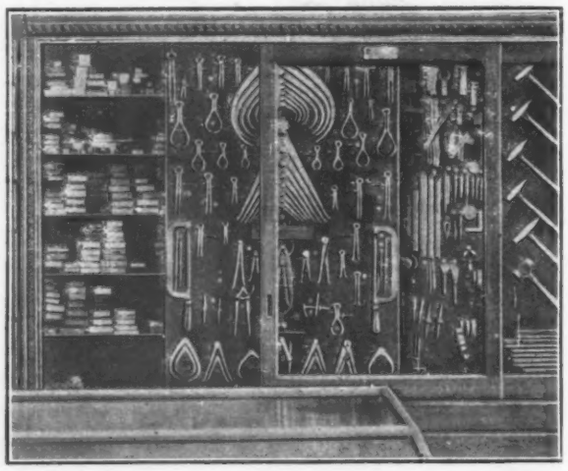


Fig. 2.—Machinists' Fine Tools Mounted on Sliding Panels.

ledge, also under the counters. The fronts of the two counters nearest the front of the store have glass fronts, behind which the class of goods enumerated in Fig. 1 are sampled. The Nail counter is next to those with glass fronts, followed by a counter upon which Wire Cloth is measured, from the rack near by. The horseshoe shaped showcases near the entrance attract the attention of customers upon entering, as they contain interesting goods, including Fancy Nickel Ware, Carving Sets, Nickel Bathroom Fixtures, Alarm Clocks, Lamps, &c. Back of the show cases season goods are shown, while the shelving on the left hand side of the store is devoted to Enameled and Tin Ware, Kitchen Utensils and Paints

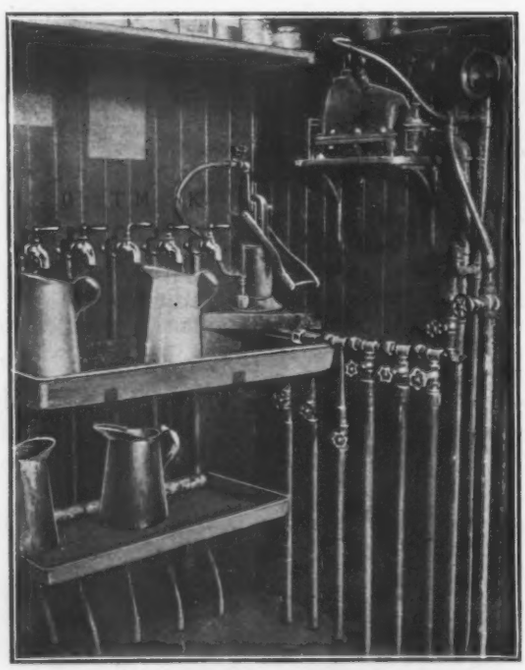


Fig. 3.—Arrangement for Drawing Oil.

and Painters' Supplies. At the rear end of the shelving are the stairs leading to the cellar and second story.

Machinists' Fine Tools in Wall Case.

In Fig. 2 is shown the arrangement of Machinists' Fine Tools, contained in the third wall case from the front of the store on the right hand side. The goods are sampled on two panels, which pass each other to get at the surplus stock on shelves back of them. The panels are mounted

on rollers, which run on track. The samples are protected by the sliding door of the wall case.

Arrangement for Drawing Oil.

Fig. 3 illustrates the arrangement for drawing Oil, which is located at the side of the staircase. The letters above the six faucets stand for Boiled Linseed Oil, Raw Oil, Dryer, Spirits Turpentine, Machine Oil and Kerosene. The pipes from the faucets extend to the tanks in the cellar containing the different liquids. The pump on the wall shelf is run by water pressure and forces air into a storage tank located under the floor. The air is let into the various tanks by opening the valves, shown at the right of the illustration, which forces up the liquids. The tray in which the measures stand is removable for cleaning, and also serves to catch any drip or overflow from the faucets. The hand pump in the corner was used before the beer pump was installed.

At the back of the room is the desk of the head clerk, a Steel Goods Rack and Wire Cloth Rack. The cash carrier wires enter the office at the rear of the store.

Domestic Parcels Post Bill Introduced.

FROM OUR SPECIAL CORRESPONDENT.

WASHINGTON, D. C., December 30, 1907.

THE first measure designed to carry into effect the Postmaster-General's programme for the establishment of a domestic parcels post was presented in the House on the eve of the holiday recess by Representative Daniel F. Lafean of Pennsylvania. It provides for the authorization of an experimental parcels post system in York and Adams counties, Pennsylvania, with a view to testing the feasibility of the Postmaster-General's project for a cheap rural parcels post. Mr. Lafean's bill provides as follows:

Be it enacted, &c., That the Postmaster-General, for the purpose of ascertaining the practicability of establishing the special parcels post system on the rural delivery routes throughout the United States, be, and he is hereby, authorized and directed to experiment and report to Congress not later than January 1, 1909, the result of such experiment by establishing a special parcels post system on the rural delivery routes in York and Adams counties, Pennsylvania, for packages originating on the rural delivery routes in said York and Adams counties, or at the distributing offices thereof, for delivery by rural carriers to patrons thereof at such rates as he may deem best and proper for carrying out the provisions embodied in this act; and the sum of $10,000 or so much thereof as may be necessary, be, and the same is hereby, appropriated, out of any money in the Treasury not otherwise appropriated, for the purpose of carrying out the provisions of this act.

It should be clearly understood that Mr. Lafean's bill is designed as an alternative, or substitute proposition, to be brought forward only in the event that the Postmaster-General's much more comprehensive projects are rejected by the Post Office Committees of the two houses. The tremendous wave of popular disapproval that has swept over the country since the details of the Post Office Department's schemes were fully disclosed in the annual departmental reports has served to admonish General Meyer that Congress will have to ignore the wishes of the people at large if it provides the legislation he desires, and he therefore proposes to forestall failure by taking advantage of the experience of the Department in the establishment of the rural free delivery service, which, it will be remembered, started out with an "experimental" appropriation of $10,000, but which for the coming fiscal year will cost nearly $40,000,000, four-fifths of which vast sum will be paid by the public at large, which receives no benefit whatever from this costly service. It is significant that the appropriation carried by this measure is exactly the same as the sum originally allotted to test the rural free delivery plan.

Scope and Purpose of the Measure.

Mr. Lafean states very frankly that his bill represents the views of the Postmaster-General, whom he has consulted, and upon whose orders he has been furnished with data which he has incorporated in a statement regarding the scope and purpose of his measure, in part as follows:

If the recommendation of the Postmaster-General is carried out the patron along the route can order and have the local country merchant deliver goods to him at the average cost of 2 cents a pound, or 25 cents for 11 lb., whereas under the present system if this patron desires to order merchandise from his dealer he can only have delivered to him packages which are mailable and not in excess of 4 lb. in weight, which at the present rate of postage would cost him 64 cents.

The Government by the establishment of this special parcels post would have an additional source of revenue in that it would be paid for the carrying of all packages of merchandise by the carrier.

The proposed experiment would do more to remove the prejudice and opposition against the parcels post than anything that could be done. When the rural free delivery service was in its infancy the progress was slow because of the determined opposition from the country merchants, who were invariably the postmasters, and who were under the impression that the establishment of the rural free delivery would mean the discontinuance of the office and necessarily affect their business by driving trade to larger cities and towns, from which the rural free delivery routes started.

For this reason these same merchants object to the establishing of the parcels post in the United States, alleging that the rural residents would then order merchandise from mail order houses in the larger cities, thus adversely affecting the business of the country merchant.

York and Adams counties are particularly well adapted for making the test. In the first place, these two counties have a rural free delivery service excelled by no other district in the country, there being 142 routes in the two counties, which were laid out not to serve any particular person or afford employment to any particular carrier, or to be a source of revenue to any particular postmaster, but distributed all over the district from such points as would afford the patrons the best possible service with the least expense to the Government.

The reason I did not fix any definite amount to be charged, as suggested by both the Postmaster-General and the Fourth Assistant Postmaster-General, is that the work which I intend to be done in the Twentieth Congressional District is to be experimental, and for this reason did not deem it wise to tie the hands of the Postmaster-General in the matter of charges.

As to the $10,000 asked to be appropriated, it is hardly likely that it will be necessary to expend much thereof other than possibly for traveling expenses of officials or special inspectors who may have this experimental work in charge and possibly a few dollars for special stationery and blanks.

In preparing this statement Mr. Lafean has inadvertently fallen into errors which are absolutely fatal to the project he advocates. For example, he states that if the patron of a rural route desires to order merchandise from a local dealer he can only have delivered to him packages which are mailable and not in excess of 4 lb. in weight and at a cost of 64 cents. The facts are exactly the reverse. The patron of any route can have delivered to him by a carrier any package weighing in excess of 4 lb., even though it may be made up of a number of smaller packages, and the charge is never more than 10 cents, but is usually practically gratuitous. It is this cheap service by carriers, the cost of which, if there is any cost, is borne by the purchaser, that the Postmaster-General proposes to abolish and in its place to require retail merchants to make deliveries by mail, prepaying the postage at rates which, however small, are nevertheless recognized by all experienced merchants as absolutely prohibitory.

Bill Is Part of Carefully Arranged Programme.

The Lafean bill appears to have been launched by a preconcerted movement, of which the catalogue house concerns have been fully advised, for Senators and Representatives who are spending the holidays in Washington are already beginning to receive petitions in its favor bearing evidence of a common origin and closely resembling the post card memorials which the mail order houses have distributed in large numbers in packages of merchandise. The catalogue concerns are making a clumsy attempt, however, to throw dust in the eyes of the public by pretending indifference or hostility to the Postmaster-General's projects, and press dispatches have been sent out from Chicago during the past week to the effect that "the project of defeating the parcels post measures in Congress has been undertaken by Chicago mail order houses as a matter of self-defense." It is doubtful if any one will be deceived by these tactics. To those who are familiar with the facts they indicate the character of the expedients these concerns are resorting to for the purpose of concealing their real interest in this campaign.

Retail Hardware Conventions.

As usual most of the retail Hardware conventions of the year will be held in February, although quite a number are slated for January. All of the associations which meet during the first three months of the year have selected dates for the annual gatherings, except California, and particulars as to the dates and places are given below. Many of the associations have made elaborate plans for accommodating Hardware exhibits by manufacturers and jobbers, and where this is the case the fact is indicated by an asterisk in connection with the name of the association:

IDAHO ASSOCIATION, Boise, January 3 and 4. Secretary, J. F. Cook, Boise.

INLAND EMPIRE ASSOCIATION, Spokane, Wash., January 15, 16 and 17. Secretary, E. W. Evenson, Spokane.

OREGON ASSOCIATION, Portland, January 21 and 22. Acting Secretary, C. D. Lownsdale, Portland.

TEXAS ASSOCIATION,* Dallas, January 21-23. Secretary, J. W. McManus, Dallas.

PACIFIC FEDERATION, Portland, Ore., January 23-25. Secretary, E. W. Evenson, Spokane, Wash.

NORTH DAKOTA ASSOCIATION, Fargo, January 28-30. Secretary, C. N. Barnes, Grand Forks.

SOUTH DAKOTA ASSOCIATION,* Aberdeen February 4-7. Secretary, H. E. Johnson, Redfield.

WISCONSIN ASSOCIATION,* Milwaukee, February 5-7. Secretary, C. A. Peck, Berlin.

CONNECTICUT ASSOCIATION, Meriden, February 10 and 11. Secretary, James de F. Phelps, Windsor Locks.

KENTUCKY ASSOCIATION, Louisville, February 11-13. Secretary, John R. Sower, Frankfort.

NEBRASKA ASSOCIATION,* Lincoln, February 11-14. Secretary, J. Frank Barr, Lincoln.

INDIANA ASSOCIATION,* Indianapolis, February 18-21. Secretary, M. L. Corey, Argos.

IOWA ASSOCIATION,* Cedar Rapids, February 18-21. Secretary, A. R. Sale, Mason City.

NEW YORK ASSOCIATION,* Buffalo, February 18-22. Secretary, John B. Foley, Syracuse.

OHIO ASSOCIATION,* Columbus, February 25-27. Secretary, Frank A. Bare, Mansfield.

MINNESOTA,* St. Paul, February 25-28. Secretary, M. S. Mathews, Guaranty Building, Minneapolis.

ILLINOIS ASSOCIATION,* Peoria, February 26-28. Secretary, L. D. Nish, Elgin.

NEW ENGLAND ASSOCIATION,* Boston, March 11 and 12. Secretary, Chas. L. Underhill, Somerville, Mass.

Iowa Retail Hardware Association.

It has been arranged to hold the business sessions of the tenth annual convention of the Iowa Retail Hardware Association at Cedar Rapids, February 18-21, in the Y. M. C. A. auditorium, the headquarters being at the Montrose Hotel. One of the important topics which will be brought up for discussion will be parcel post, and Charles W. Burrows of Cleveland, Ohio, who has given much study to this subject, will make a formal address. A large number of manufacturers and jobbers will be represented by exhibits, and we understand that more than 50 per cent. of the space in the large auditorium has already been contracted for. The entertainment features of the convention are in the efficient charge of George T. Gadd of the George T. Gadd Hardware Company, and Secretary Rolland Shaver of the Commercial Club of Cedar Rapids.

THE MANSON HARDWARE COMPANY, Burlington, Vt., successor to John A. Manson & Co., has recently built a large addition to its store so as to connect it with storehouse. Through purchase of the property the company now owns the entire space from Church to Center street, a depth of nearly 250 ft. Many improvements have been made in the store arrangement and several new lines of goods added. The company gives special attention to such lines as P. & F. Corbin's Builders' Hardware, Jewell Belting Company's Belting, J. C. Pearson Company's Coated Nails, Pittsburgh Perfect Fencing, Rex Flintkote Roofing, Patterson & Sargent's Paints, Rutland Asbestos Wall Plaster and the Union Metal Corner Company's product. The Manson Company is one of the most prominent and successful Hardware houses in the State, and its facilities for the conduct of the business are up to date and complete.

CHILDREN AS AN ADVERTISING MEDIUM.

MANY Hardware retailers have recognized the importance and value of the good will of children, and have cultivated it in one way or another as an asset of the business. It makes good advertising for the store, and as children later become adults it often lays a foundation for future trade. One merchant running a small general store in a Western town has gone a little further in this direction than usual. Desirous of developing his modest business, and figuring that this could perhaps be done through interesting the youngsters in the vicinity, he adopted the plan of handing out gifts to the children when they made purchases.

Similarly the baker often bestows a cake or a bun, the grocer an apple or an orange and the confectioner a piece of chocolate or a lemon stick; but this wideawake shopkeeper did not select his presents from stock, but as was more effective from an advertising standpoint, bought them especially for gift purposes. After studying the situation carefully he laid in a supply of candies and cheap toys and books. Good judgment was used in the selection of the latter, the toys being of a somewhat substantial character and the books of the wholesome and humorous type. When the boys and girls came to the store to make purchases on behalf of their elders he handed each a present, the value of which was determined by the size of and profit on the purchase made. He also reminded each child that he was ready to supply anything at all in his line, and that every order had its reward for the bearer.

At first the profits yielded by the business were less than before, for the children whose appetite had been whetted came to the store for nearly everything from a needle to an ocean steamer, and the proprietor was obliged to add many articles to his stock. In many cases these were obtained by paying full price, from neighboring stores, so that there was no financial gain in selling them. Gradually, however, the regular stock was enlarged until the merchant was able to fill a very large proportion of the children's requirements without resorting to pick-up methods, and then the business showed handsome returns. An interesting feature of our friend's experience is that he has frequently been thanked in person by the parents of the children dealing with the store for putting the gift practice into effect. He seems to have overcome the antipathy with which most youngsters view the running of errands when no reward is promised or expected.

GEORGE L. MARBLE of the Union Metallic Cartridge Company, Bridgeport, Conn., is in attendance at the first annual exposition of the Forest, Fish, Game and Sportsmen's Exhibition, at the Grand Central Palace, New York, for the two weeks ending January 4. He is in charge of the company's interests in connection with the School Boy Rifle Shooting Tournament, which is being conducted under the auspices of the National Rifle Association of America and the Public Schools Athletic League of New York, and which is also receiving the financial and moral support of President Roosevelt and Secretary of War Taft. Mr. Marble is assistant to William M. Thomas, ballistic engineer to the Union Metallic Cartridge Company.

LEWIS G. KUHN has been appointed New York manager of the branch houses of L. S. Starrett Company, Athol, Mass., and S. W. Card Mfg. Company, Mansfield, Mass., manufacturers, respectively, of mechanics' fine Tools and Taps, Dies and Screw Cutting Tools, with headquarters as heretofore, at 132 Liberty street, where completed stocks are carried for the prompt execution of orders. Mr. Kuhn has been educated in this line from the start, having entered it as office boy with A. H. Briggs,

who established the Starrett branch in New York about 10 years ago, but who has resigned to go into business for himself as representative for manufacturers in allied lines. Mr. Kuhn has traveled for the Starrett Company for the last six years, covering all territory east of Pittsburgh and south as far as Richmond.

Ham Automobile Lamps.

The C. T. Ham Mfg. Company, Rochester, N. Y., represented directly by John H. Graham & Co., 113 Chambers street, New York, has recently brought out a gray-black nickel finish on brass, in connection with lanterns for automobiles. No polishing is required, a damp rag being sufficient with which to wipe off dust and soil, and notwithstanding the disadvantages of heat, oil and weather, the luster is retained. The finish is put on by an electroplating process and can be obtained in connection with any of the Ham automobile lamps.

Adjustable Flexible Door Hangers.

The accompanying illustrations show the adjustable feature in door hangers, recently adopted by F. E. Myers & Bro., Ashland, Ohio. The front and rear views of single and tandem hangers are shown, also the flexible feature. Both styles of hanger can be adjusted perpendicularly so as to locate the door above the ground at any point, or laterally, so as to adjust the door to or from the building, and also to any thickness of door. The perpendicular and lateral adjustments are made with an ordinary wrench, at the will of the user. In Fig. 1 the manner in which the wheel is mostly covered and the bracing of the frame is shown. The back view is also given with the center bolt and nut, by means of which the door can be raised or lowered at either end. In Fig. 3 a side view of the hanger is shown with the cross bolt by means of which the door can be adjusted to or from the building. The adjustable features are the same in both styles of hanger.

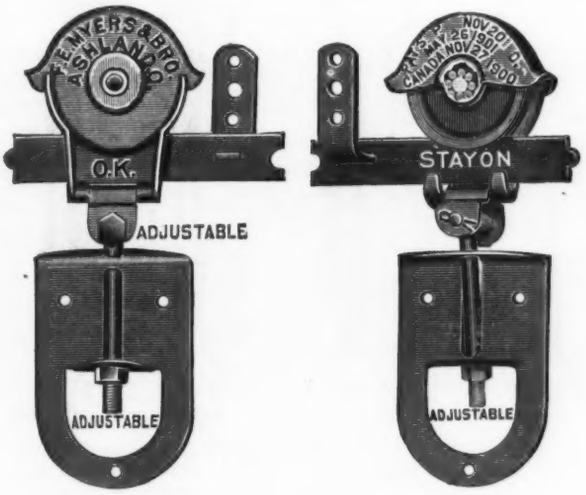


Fig. 1.—O. K. Adjustable Stayon Flexible Door Hanger.

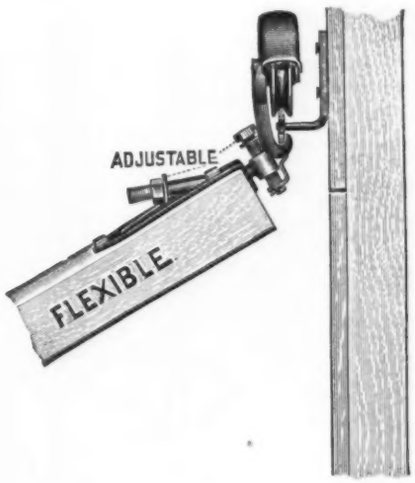


Fig. 3.—Swing Out Device.

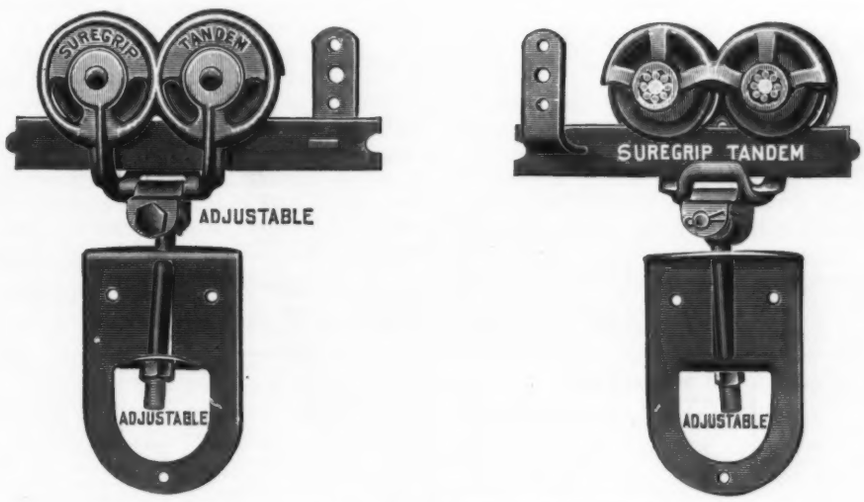
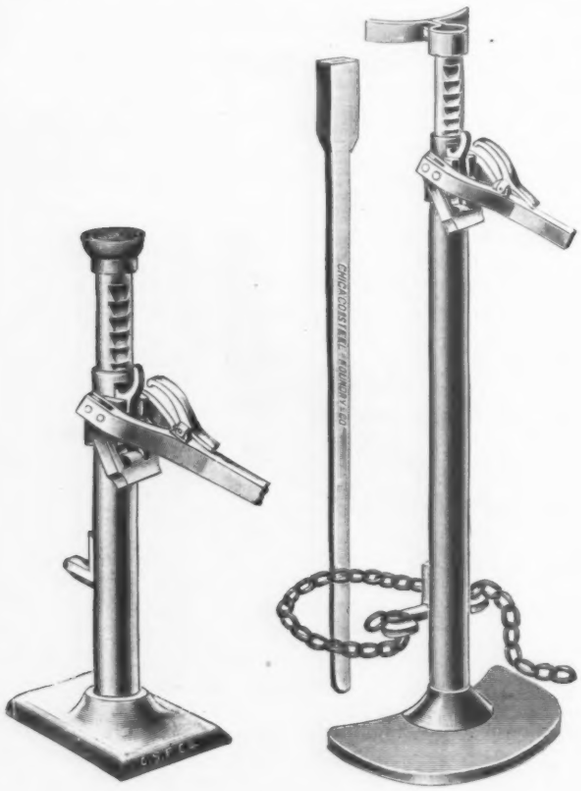


Fig. 2.—Sure Grip Tandem Flexible Door Hanger.

Lifting Jacks.

The Chicago Steel Foundry Company, Chicago, is putting out a new line of jacks, two examples of which are shown in the accompanying illustrations. They are designed to embody a maximum lifting capacity with a minimum of weight and mechanism. These points, together with ease and durability of operation, constitute the principal features of excellence claimed. The No. 6 heavy machinery jack is built for heavy work and is described as strong enough to stand any leverage that may be applied. It is supplied with double triggers so arranged that one takes hold before the other releases, thereby guarding against a slip under the pressure of a load. The shell is cast steel 2 in. in diameter and carries a ratcheted lifting post made of cold rolled steel. It is provided with a lifting foot for convenience in getting under low loads and for service on railroad track work. The jack has a capacity of 12 tons, weighs 50 lb., stands 23 in. in hight, and has a length of lift of 12 in. It is mounted on a broad firm base and is entirely self-contained. The other jack illustrated is specially designed for pulling telegraph or telephone poles. Its lifting mechanism is similar in all respects to the machinery jack already described and is made of like material. It is

fitted with cast steel yokes and is clamped to the pole near the base by means of a chain. The semi-circular base is cut away on concave form on one side, to conform to the shape of the pole, thus permitting a direct upward pull. It is of the same dimensions of the machinery jack except that it stands 45 in. in hight, and weighs 100 lb.



No. 6. No. 7.

Lifting Jacks.

It has a lift per stroke of ¾ in. and a total length of lift 31 in. Besides the patterns here illustrated, the company makes a number of other jacks adapted to special uses, chief of which is a light, quick acting automobile jack furnished with a detachable lifting foot, which enables the operator to lift loads which are close to the ground.

Wire Chairs and Stools.

The Chicago Wire Chair Company, 129 La Salle avenue, Chicago, is offering a line of steel wire factory stools and office chairs, examples of which are illustrated herewith. Besides limiting the amount of combustible material in a building this furniture is said to be exceptionally strong and durable. The legs are constructed of double Bessemer steel wires closely twisted at the lower end to give proper rigidity, and are braced by a continuous wire band passing through each leg. The seats are made either wholly of steel or with wooden tops, as desired. The stool as shown in Fig. 2 is also made with a high or low back, which adds greatly to the comfort of the user and is especially desirable for certain kinds of work. The backs supplied to both chairs and stools are flexible and at the same time strong and reliable. Frames are finished in antique, and the seats, when made of wood, are of quartered oak, golden or mahogany finish. For use in offices having hardwood floors or linoleum carpets both stools and chairs are equipped with rubber feet, which makes them noiseless and prevents damage to the floor.

Fig. 1.—Steel Wire Office Chair.

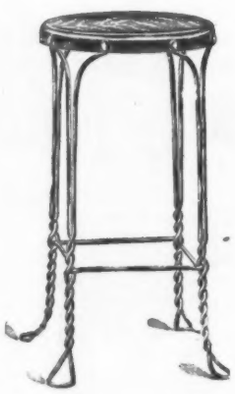


Fig. 2.—Wire Stool Without Back.

PAINTS, OILS AND COLORS

Animal, Fish and Vegetable Oils—

	℔ gal.
Linseed, State and Western, raw	@43
City, Boiled	@46
City, Raw	@45
Raw, Calcutta, in bbls.	@..
Lard, Extra Prime, Winter	@77
Extra No. 1	@56
No. 1	@52
Cotton-seed, Crude, f.o.b. mill	@30
Summer Yellow, prime	@38¾
Summer White	@42
Yellow Winter	@45
Sperm, Crude	@60
Natural Winter	@74
Bleached Winter	@76
Bleached Winter, Extra	@..
Tallow, Prime	@60
Whale, Crude	@36
Natural Winter	@48
Bleached Winter	@51
Extra Bleached Winter	@54
Menhaden, Brown, Strained	@42
Light Strained	@42
Northern	@..
Southern	@..
Cocoanut, Ceylon	℔ lb 7¼@..
Cochin	℔ lb 8½@..
Cod, Domestic, Prime	@44
Newfoundland	@46
Red, Elaine	@46
Saponified	℔ lb 6 @ 6¼
Olive, Yellow	@75
Neatsfoot, Prime	@58
Palm, Lagos	℔ lb 6¼@ 6½

Mineral Oils—

	℔ gal.
Black, 29 gravity, 25@30 cold test	@13½
29 gravity, 15 cold test	13½@14
Summer	12½@13
Cylinder, light filtered	20½@21
Dark, filtered	18 @19
Paraffine, 903-907 sp. gravity	14½@15
903 sp. gravity	13½@14
883 sp. gravity	11 @11½
Red	13½@14

Miscellaneous—

	℔ ton
Barytes:	
White, Foreign	$18.50@20.50
Amer. floated	19.00@20.00
Off color	13.00@16.50
Chalk, in bulk	3.00@ 3.25
In bbls.	℔ 100 lb .@ .35
China Clay, Imported	℔ ton 11.00@17.50
Cobalt, Oxide	℔ 100 lb 2.50@ 2.60
Whiting, Commercial	℔ 100 lb .43@ .52
Gilders	℔ 100 lb .55@ .65
Ex. Gilders	℔ 100 lb .60@ .65

Putty, Commercial—℔ 100 lb

In bladders	$1.70 @1.85
In bbls. or tubs	1.20 @1.45
In 1 lb to 5 lb cans	2.65 @2.95
In 12½ to 50 lb cans	1.50 @1.90

Spirits Turpentine—℔ gal.

In Oil bbls.	44 @44½
In machine bbls.	44½@45

Glue—

	℔ lb
Cabinet	12 @15
Common Bone	7½@ 9
Extra White	18 @24
Foot Stock, White	12 @14
Foot Stock, Brown	9 @11
German Hide	12 @18
French	10 @40
Irish	13 @16
Low Grade	10 @12
Medium White	14 @17

Gum Shellac—

	℔ lb
Bleached, Commercial	28 @30
Bone Dry	35 @37
Button	40 @50
Diamond I	50 @52
Fine Orange	31 @35
A. C. Garnet	41 @43
G. A. L.	25 @26
Kala Button	20 @22
D. C.	53 @54
Octagon B	51 @52
T. N.	26 @27
V. S. O.	50 @52

Colors in Oil—

	℔ lb
Black, Lampblack	12 @14
Blue, Chinese	36 @46
Blue, Prussian	32 @36
Blue, Ultramarine	13 @16
Brown, Vandyke	11 @14
Green, Chrome	12 @16
Green, Paris	@24
Sienna, Raw	12 @15
Sienna, Burnt	12 @15
Umber, Raw	11 @14
Umber, Burnt	11 @14

White Lead, Zinc, &c.—

	℔ lb
Lead, English white, in Oil	10½@10⅝
Lead, American White:	
Lots of 500 lb or over, in Oil	@ 6¾
Lots less than 500 lb, in Oil	@ 7¼
Lead, White, in oil, 25 lb tin pails	@ 7¼
Lead, White, in oil, 12½ lb tin pails	@ 7¾
Lead, White, in oil, 1 to 5 lb assorted tins	@ 8¾

Lead, American. Terms: On lots of 500 lbs. and over 2% for cash if paid in 15 days from date of invoice.

	℔ lb
Zinc, American, dry	5⅝@ 5½
Zinc, French:	
Antwerp, Red Seal, dry	8¼
Antwerp, Green Seal, dry	10½
Paris, Red Seal, dry	8¾
Paris, Green Seal, dry	10¾
Zinc, V. M. French, in Poppy Oil: Green Seal:	
Lots of 1 ton and over	12⅞@13⅜
Lots of less than 1 ton	13⅛@13⅝
Zinc, V. M. French, in Poppy Oil: Red Seal:	
Lots of 1 ton and over	11⅜@11⅞
Lots of less than 1 ton	11⅝@12⅛

Discounts.—French Zinc.—Discounts to buyers of 10 bbl. lots of one or mixed grades, 1%; 25 bbls., 2%; 50 bbls., 4%.

Dry Colors—

	℔ lb
Black, Carbon	6½@10
Black Drop, American	3½@ 8
Black Drop, English	5 @15
Black, Ivory	16 @20
Lamp, commercial	4 @ 6
Blue, Celestial	4 @ 6
Blue, Chinese	30 @33
Blue, Prussian	28 @32
Blue, Ultramarine	3½@15
Brown, Spanish	½@ 1
Carmine, No. 40	$3.10@3.25
Green, Chrome, ordinary	3½@ 5
Green, Chrome, pure	17 @25
Lead, Red, bbls., ½ bbls., kegs.	@ 6¾
Litharge, bbls., ½ bbls., kegs.	@ 6¾
Ocher, American	℔ ton $8.50@16.00
American Golden	2½@ 3¼
French	1¼@ 2
Foreign Golden	3 @ 4
Orange Mineral, English	10 @12
French	11½@12
German	10 @12
American	8¾@ 9
Red, Indian, English	4½@ 6
American	3 @ 3¼
Red, Turkey, English	4 @10
Red, Tuscan, English	7 @10
Red, Venetian, Amer.	℔ 100 lb $0.50@1.25
English	℔ 100 lb $1.15@1.60
Sienna, Italian, Burnt and Powdered	3 @ 9
Italian, Raw, Powdered	3 @ 7
American, Raw	1½@ 2
American Burnt and Pow'd.	1½@ 2
Talc, French	℔ ton $18.00@25.00
American	℔ ton 15.00@25.00
Terra Alba, French	℔ 100 lb .90@ 1.00
English	℔ 100 lb .80@ 1.00
American	℔ 100 lb, No. 1, .75@ .80
American	℔ 100 lb, No. 2, .60@ .65
Umber, Turkey, Bnt. & Pow.	2 @ 3¼
Turkey, Raw and Powdered	2¼@ 3½
Burnt, American	1½@ 2
Raw, American	1½@ 2
Yellow Chrome, Pure	12 @14
Vermilion, American Lead	7 @25
Quicksilver, bulk	65 @..
Quicksilver, bags	@65
English, Imported	65 @70
Chinese	$0.90@1.00

Current Hardware Prices.

General Goods.—In the following quotations General Goods—that is, those which are made by more than one manufacturer—are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

Special Goods.—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

Range of Prices.—A range of prices is indicated by means of the symbol @. Thus 33⅓ @ 33⅓ & 10% signifies that the price of the goods in question ranges from 33⅓ per cent. discount to 33⅓ and 10 per cent. discount.

Names of Manufacturers.—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE DIRECTORY, issued May, 1907, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

Standard Lists.—"The Iron Age Standard Hardware Lists" contains the list prices of many leading goods.

Additions and Corrections.—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

Adjusters, Blind—

Columbian and Domestic.....33⅓%
North's 10%
Zimmerman's—See Fasteners, Blind.

Window Stop—

Ives' Patent.....35%
Taplin's Perfection.....33⅓%

Ammunition— See *Caps, Cartridges, Shells, &c.*

Anti-Rattlers—

Fernald Mfg. Co. Burton Anti-Rattlers, ₱ doz. pairs, Nos. 1, $0.75; 2, $0.60; 4, $1.00; 5, $0.50.
Fernald Quick Shifter, ₱ doz. pairs .....$2.00@$3.00

Anvils—American—

Eagle Anvils.....₱ lb @8½¢
Hay-Budden, Wrought.....9½@9¾¢
Trenton .....₱ lb 9½@9¾¢

Imported—

Peter Wright & Sons, ₱ lb, 84 to 349 lb, 11¢; 350 to 600 lb, 11½¢.

Anvil, Vise and Drill—

Millers Falls Co., $18.00.....15&10%

Apple Parers— See *Parers, Apple, &c.*

Aprons, Blacksmiths'—

Livingston Nail Co.....10%

Augers and Bits—

Com. Double Spur.....75@80%
Jennings' Patn., Bright.65&10@70%
Black Lip or Blued...65@65&5%
Boring Mach. Augers.....70%
Car Bits, 12-in. twist.....40&10%
Ford's Auger and Car Bits.....40&5%
Ft. Washington Auger Co., Conard's 35%
Forstner Pat. Auger Bits.....25%
C. E. Jennings & Co.:
No. 10 ext. lip, R. Jennings' list, 25&7½%
No. 30, R. Jennings' list.....50%
Russell Jennings'.....25&10&2½%
L'Hommedieu Car Bits.....15%
Mayhew's Countersink Bits.....45%
Pugh's Black.....20%
Pugh's Jennings' Pattern.....35%
Snell's Auger Bits.....60%
Snell's Bell Hangers' Bits.....60%
Snell's Car Bits, 12-in. twist.....60%
Snell's King Auger Bits.....50%
Wright's Jennings' Bits.....50%

Bit Stock Drills—

See *Drills, Twist.*

Expansive Bits—

Clark's Pattern, No. 1, ₱ doz. $26; No. 2, $18.....60&10%
Ford's, Clark's Pattern.....66⅔&5%
C. E. Jennings & Co., Steer's Pat..25%
Lavigne Pat., small size, $18.00; large size, $26.00.....60&10%
Swan's 60%

Gimlet Bits—

Per gro.
Common Dble. Cut....$3.00@3.25
German Pattern, Nos. 1 to 10, $4.75; 11 to 13, $5.75

Hollow Augers—

Bonney Pat., per doz..$6.50@7.00
Ames .....25&10%
Universal 20%

Ship Augers and Bits—

Ship Augers.....40&10%
Ford's .....33⅓&5%
C. E. Jennings & Co.:
L'Hommedieu's 6%
Watrous' .....33⅓&7½
Snell's 40%

Awl Hafts—See *Handles, Mechanics' Tool.*

Awls—

Brad Awls:
Handled .....*gro. $2.75@3.00*
Unhdled, Shldered...*gro.63@66¢*
Unhandled, Patent..*gro.66@70¢*
Peg Awls:
Unhandled, Patent..*gro. $1@$1.4*
Unhdled, Shldered..*gro. 65@70¢*
Scratch Awls:
Handled, Com...*gro. $3.50@4.00*
Handled, Socket..*gro.$11.50@12.00*

Awl and Tool Sets—See *Sets, Awl and Tool.*

Axes—

Single Bit, base weights: Per doz.
First Quality.....$4.75@5.00
Second Quality.....$3.25@4.50
Double Bit, base weights:
First Quality.....$7.00@7.50
Second Quality.....$6.50@6.75

Axle Grease—

See *Grease, Axle*

Axles— *Iron or Steel*

Concord, Loose Collar..4½@5 ¢
Concord, Solid Collar...4¾@5¼¢
No. 1 Common, Loose....3¾@4¼¢
No. 1½ Com., New Style.4½@5 ¢
No. 2 Solid Collar.....4½@5 ¢
Half Patent:
Nos. 7, 8, 11 and 12..65@65&10%
Nos. 13 to 14.....65@65&10%
Nos. 15 to 18.....70@70&10%
Nos. 19 to 22.....70@70&10%

Boxes, Axle—

Common and Concord, not turned lb., 5@6¢
Common and Concord, turned. lb., 6@7¢
Half Patent.....*lb., 9½@10¢*

Bait— Fishing—

Hendryx:
A Bait.....20%
B Bait.....25%
Competitor Bait.....20&5%

Balances— Sash—

Caldwell new list.....50%
Pullman .....50&10@60%

Spring—

Spring Balances.....50&10@60%
Chatillon's:
Light Spg. Balances.....50@50&10%
Straight Balances.....40@40&10%
Circular Balances.....50&10%
Large Dial.....30%

Barb Wire—See *Wire, Barb.*

Bars— Crow—

Steel Crowbars, 10 to 40 lb.... per lb., —@2½@2¾¢

Towel—

No. 10 Ideal, Nickel Plate..₱ gro. $8.50

Beams, Scale—

Scale Beams.....40%
Chattillon's No. 1.....30%
Chattillon's No. 2.....40%

Beaters, Carpet—

Holt-Lyon Co.:
No. 12 Wire Coppered ₱ doz. $0.80; Tinned $0.85
No. 11 Wire Coppered ₱ doz. $1.15; Tinned $1.20
No. 10 Wire Tinned.....₱ doz. $1.50

Beaters, Egg—

Holt-Lyon Co.:
Holt, per doz., No. 5, Jap'd, $0.80; No. A, Jap'd, $1.15; No. B, Jap'd, $1.85; No. 6, Jap'd, $1.65, Lyon, Jap'd, per doz., No. 2, $1.35.
Taplin Mfg. Co.:
Improved Dover, per gro., No. 60, $6.00; No. 75, $6.50; No. 100, $7.00; No. 102, Tin'd, $8.50; No. 150, Hotel, $15.00; No. 152, Hotel Tin'd, $17.00; No. 200, Tumbler, $8.50; No. 202, Tumbler Tin'd, $9.50; No. 300, Mammoth, per doz., $25.00.
Turner & Seymour Mfg. Co.:
T. & S. Dover.....$6.50

Bellows—

Blacksmith, Standard List..
Split Leather.....60&10@65%
Grain Leather.....50@50&10%

Hand—

Inch..	6	7	8	9	10
Doz..	$5.00	5.50	6.00	6.50	7.50

Molders—

Inch..	10	12	14	16
Doz..	$7.50	9.00	12.00	15.00

Net Prices.

Bells— Cow—

Ordinary Goods..75&5@75&10&5%
High grade.....70&10@75%
Jersey .....75&10%
Texas Star.....50%

Door—

Home, R. & E. Mfg. Co.'s.....55&10%

Hand—

Polished, Brass.....50&10@60%
White Metal....50&10@50&10&5%
Nickel Plated.....50&5%
Swiss .....50&5%
Cone's Globe Hand Bells.....33⅓@35%

Miscellaneous—

Farm Bells.....*lb.*, 2¼@2½¢
Church and School....60@60&5%

Belting— Leather—

Extra Heavy, Short Lap..60&5%
Regular Short Lap....60&10&5%
Standard .....70&5%
Light Standard.....75%
Cut Leather Lacing.....40&10%
Leather Lacing Sides, per sq. ft. 2½¢

Rubber—

Agricultural (Low Grade).... 75@75&5%
Common Standard....70@70&10%
Standard .....70@70&5%
Extra .....60&5@60&10%
High Grade.....50&5@50&10%

Bench Stops—

See *Stops, Bench*

Benders and Upsetters, Tire—

Green River Tire Benders and Upsetters 20%

Bicycle Goods—

John S. Leng's Son & Co.'s 1907 list: Chain, Parts, Spokes.....50%
Tubes 60%

Bits—

Auger, Gimlet, Bit Stock Drills, &c.—See *Augers and Bits.*

Blocks— Tackle—

Common Wooden.....75%
B. & L. B. Co.:
Boston Wood Snatch, 50%; Eclipse Steel, 75%; Hollow Steel, 50&10%; Star Wire Rope, 50%; Tarbox Metal Snatch, 50%; Tarbox New Style Steel, 50&10%; Wire Rope Snatch, 50%.
Lane's Patent Automatic Lock and Junior 30%
See also Machines, Hoisting.

Boards, Stove—

Paper and Wood Lined.....40%
Embossed 50%

Boards, Wash—

See *Washboards.*

Bobs, Plumb—

Keuffel & Esser Co.....33⅓%

Bolts—

Carriage, Machine, &c.—

Common Carriage (cut thread):
⅜ × 6 and smaller..70&5@—%
Larger and longer.....65@—%
Phila. Eagle, $3.00 list...80@—%
Bolt Ends.....65&5@—%
Machine (Cut Thread):
⅜ × 4 and smaller.70&7½@—%
Larger and longer...65&5@—%

Door and Shutter—

Cast Iron Barrel, Japanned, Round Brass Knob:

Inch	3	4	5	6	8
Per doz.	$0.30	.35	.45	.60	.80

Cast Iron Spring Foot, Jap'd:

Inch	6	8	10
Per doz.	$1.20	1.50	2.25

Cast Iron Chain, Flat, Japanned:

Inch.....	6	8	10
Per doz.	$1.00	1.40	1.65

Cast Iron Flat Shutter, Jap'd., Brass Knobs:

Inch.....	6	8	10
Per doz.	$0.75	.95	1.25

Wrought Barrel Japd.80@80&10%
Barrel Bronzed.....60&10%
Spring .....70&10@70&10&10%
Shutter .....50&5@50&10&5%
Square Neck.....75@75&10%
Square .....70&10&10%
Ives' Patent Door.....55%
Ives' Wrought Metal.....45%

Expansion—

Richards Mfg. Co.....50&10%

Plow and Stove—

Plow .....65&5@—%
Stove .....85@85&5%

Tire—

Common Iron.....80%
Norway Iron.....80%
American Screw Company:
Norway Phila., list Oct. 16, '84..80%
Eagle Phila., list Oct. 16, '84....82½%
Bay State, list Dec. 28, '99.....80%
Franklin Moore Co.:
Norway Phila., list Oct. 16, '84..80%
Eagle Phila., list Oct. 16, '84....82½%
Eclipse, list Dec. 28, '99.....80%
Russell, Burdsall & Ward Bolt & Nut Co.:
Empire, list Dec. 28, '99.....80%
Norway Phila., list Oct., '84.....80%
Eagle 82½%
Shelton Co.:
Tiger Brand, list Dec. 28, '99.....80%
Phila., Eagle, list Oct. 16,1884..82½%
Upson Nut Co.:
Tire Bolts.....72½%

Borers, Bung—

Borers Bung, Ring, with Handle:

Inch.....	1¼	1½	1¾	2
Per doz....	$4.80	5.60	6.40	8.00
Inch	2¼	2½		
Per doz.....	$8.65	11.50		

Enterprise Mfg. Co., No. 1, $1.25; No. 2, $1.75; No. 3, $2.50 each.....25%

Boxes, Mitre—

C. E. Jennings & Co.....25%
Langdon, New Langdon and Langdon Improved, 20&10%; Langdon Acme .....15&10%
Perfection 40%
Seavey 45%

Braces—

Common Ball, American....$1.50
Barber's .....50&10&10@60&10%
Fray's Genuine Spofford's.....60%
Fray's No. 70 to 120, 81 to 123, 207 to 414 .....60%
C. E. Jennings & Co.....50&5%
Mayhew's Ratchet.....60%
Mayhew's Quick Action Hay Pat...50%
Millers Falls Drill Braces.....25&10%
P., S. & W. Co., Peck's Pat..60&10%

Brackets—

Wrought Steel.....70&10@75&10%
Bradley Metal Clasp..80&10@80&10&5%
Griffin's Pressed Steel.....75@75&10%
Griffin's Folding Brackets.....70&10%
Taplin Victor Handy Egg Beater Bracket .....₱ doz. $1.50

Bright Wire Goods—

See *Wire and Wire Goods.*

Broilers—

Kilbourne Mfg. Co.....75&20%
Wire Goods Co.....75%

Buckets, Galvanized—

M'f'gr's list, price per gross.

Quart..	10	12	14
Water, Reg...	25.35	28.00	32.00
Water, Hvy...	45.35	48.00	52.00
Fire, Rd. Btm.	32.00	34.65	38.65
Well	37.35	41.35	45.35

1045%

Bull Rings—See *Rings, Bull*

Butts— Brass—

Wrought, High List, Oct. 26,'06.55%
Cast Brass, Tiebout's.....45%

Cast Iron—

Fast Joint, Broad....40&10@50%
Fast Joint, Narrow...40&10@50%
Loose Joint.....70&10@75%
Loose Pin.....70&10@75%
Mayer's Hinges.....70@70&5%
Parliament Butts.....70@70@5%

Wrought Steel—

Bright.

Light Narrow, Light Reversible .....70&5%
Reversible and Broad..70&5%
Loose Joint, Narrow, Light Inside Blind, &c.....70%
Back Flaps, Table Chest..65% *Japanned.*
Light Narrow, Loose Pin. 40&5%
Light Narrow, Ball Tip..60%
Broad .....40&5%
Steeple Tipped.....70%
Ball Tipped.....70%

Extra 10%

Cages, Bird—

Hendryx Brass: Series 3000, 5000, 1100, net list; 1200, 15%; 200, 300, 900 ..... 30%
Hendryx Bronze; Series 700, 800..30%
Hendryx Enameled..... 35%

Calipers—See *Compasses.*

Calks, Toe and Heel—

Blunt, 1 prong, per lb., 4¼@4¾¢
Sharp, 1 prong, per lb., 4¾@5¼¢
Burke's, Blunt, 4@4¾¢; Sharp, 4½@5¼¢
Lautier, Blunt, 4@4¼¢; Sharp, 4½@4¾¢
Perkins', Blunt, ℔ lb, 3.65¢; Sharp, 4.15¢

Can Openers—

See *Openers, Can.*

Caps, Percussion—

Eley's E. B..... 65@55¢
G. D.....per M 54@35¢
F. L.....per M 40@42¢
G. E.....per M 48@50¢
Musket .....per M 62@63¢

Primers—

Berdan Primers, $2 per M..20&5%
Primer Shells and Bullets..15&10%
All other primers per M.$1.52@1.60

Carpet Stretchers—

See *Stretchers, Carpet.*

Cartridges—

Blank Cartridges:

32 C. F., $5.50.....10&5%
38 C. F., $7.00.....10&5%
22 cal. Rim, $1.50.....10&5%
32 cal. Rim, $2.75.....10&5%
B. B. Caps, Con. Ball, Swgd. $1.90
B. B. Caps, Round Ball....$1.40
Central Fire.....25%
Target and Sporting Rifle..15&5%
Primed Shells and Bullets.15&10%
Rim Fire, Sporting.....50%
Rim Fire, Military.....15&5%

Casters—

Bed .....65&10%
Plate .....60&5%
Philadelphia .....70&10%
Acme, Ball Bearing..... 35%
Gem (Roller Bearing).....70&10&10&5%
Steel Gem..... 20%
Standard Ball Bearing..... 45%
Yale (Double Wheel) low list..40&10%

Cattle Leaders—

See *Leaders, Cattle.*

Chain, Proof Coil—

American Coil, Straight Link:

5-16	¼	5-16	⅜	7-16	½	9-16
$8.77	6.17	5.02	4.57	4.37	4.27	4.22

⅝ ¾ ⅞ to 1 1⅛ to 1¼ inch.
$4.17 4.07 4.02 4.12

In cask lots, deduct 25¢.

German Coil:
6-0 to 1.....70&5@70&10%
2 and 3..60&10&10@60&10&10&5%
4, 5 and 6.....50&10@50&10&5%

Halter—

Halter Chains.....60@60&5%
German Pattern Halter Chains, list July 24, '07.....60&10&5%
Covert Mfg. Co.
Halter ..... 35&5%

Cow Ties—

See *Halters and Ties.*

Trace, Wagon, &c.—

Traces, Western Standard: 100 pr.
6½—6-3, Straight, with ring..$28.00
6½—6-2, Straight, with ring..$29.00
6½—8-2, Straight, with ring..$32.00
6½—10-2, Str'ght, with ring..$37.00

NOTE.—Add 2c per pair for Hooks. Twist Traces; add per pair for Nos. 2 and 3, 2c; No. 1, 3c; No 0, 4c to price of Straight Link.

Eastern Standard Traces, Wagon Chain, &c. .60&10@60&10&5%

Miscellaneous—

Jack Chain, list July 10, '93:
Iron .....60&10%
Brass 60%
Safety and Plumbers' Chain, 60&10%
Gal. Pump Chain....lb. 4½@4¾%
Covert Mfg. Co.:
Breast, Halter, Heel, Rein, Stallion 40%
Oneida Community:
American Halter, Dog and Kennel Chains ..... 35&2½@40%
Niagara Dog Leads and Kennel Chains ..... 45@60&5%
Wire Goods Co.:
Dog Chain..... 70%
Universal Dbl.-Jointed Chain..... 50%

Chain and Ribbon, Sash—

Oneida Community:
Steel Chain..... 60%
Pullman:
Bronze Chain, 60%; Steel Chain, 60&10%
Sash Chain Attachments, per set..8¢
Aluminoy Sash Ribbon, per 100 ft..... $1.25@$3.00
Sash Ribbon Attachments, per set..8¢

Chalk—(From Jobbers.)

Carpenters' Blue....gro., 50@55¢
Carpenters' Red.....gro., 45@50¢
Carpenters' White...gro., 40@45¢

Checks, Door—

Bardsley's 45%
Pullman, per gro..... $54.00
Russwin 33⅓%

Chests, Tool—

American Tool Chest Co.:
Boys' Chests, with Tools..... 50%
Youths' Chests, with Tools..... 25%
Gentlemen's Chests, with Tools..25%
Farmers', Carpenters,' etc., Chests, with Tools..... 20%
Machinists' and Pipe Fitters' Chests, Empty..... 45%
Tool Cabinets..... 45%
C. E. Jennings & Co.'s Machinists' Tool Chests..... 7½%

Chisels—

Socket Framing and Firmer

Standard List.....75&10@—%
Buck Bros..... 30%
C. E. Jennings & Co.:
Socket Firmer No. 10.....25&7½%
Socket Framing No. 15.....25&7½%
Swan's ..... 66⅔@70%
L. & I. J. White Co.....30@30&5%

Tanged—

Tanged Firmers.....30&5@35%
Buck Bros..... 30%
C. E. Jennings & Co. Nos. 191, 181..25%
L. & I. J. White Co..... 25&5%

Cold— lb.

Cold Chisels, good quality..13@15¢
Cold Chisels, fair quality..11@12¢
Cold Chisels, ordinary... 9@10¢

Chucks—

Almond Drill Chucks..... 35%
Almond Turret Six-Tool Chuck..... 40%
Beach Pat., each $8.00..... 35&5%
Empire 25%
Blacksmiths' 25%
Jacobs' Drill Chucks..... 35%
Pratt's Positive Drive..... 25%
Skinner Patent Chucks:
Independent Lathe Chucks..... 35%
Universal, Reversible Jaws..... 35%
Combination, Reversible Jaws..... 35%
Drill Chucks, New Model, 25%; Standard, 45%; Skinner Pat., 25%; Positive Drive..... 40%
Planer Chucks..... 20%
Face Plate Jaws..... 35%
Standard Tool Co.:
Improved Drill Chuck..... 45%
Union Mfg. Co.:
Combination, Nos. 1, 2, 3, 4, 5, 6, 7, 8 and 17, 40%; No. 21..... 35%
Scroll Combination, Nos. 83 and 84 ..... 30%
Geared Scroll, Nos. 33, 34 and 35..25%
Independent Iron, Nos. 18 and 318.38%
Independent Steel, No. 64..... 25%
Union Drill, Nos. 000, 00, 100, 101, 102, 103, 104..... 35%
Union Czar Drill..... 25%
Universal, 11, 12, 16, 17, 13, 14, 15..40%
Universal, No. 42..... 35%
Iron Face Plate Jaws, Nos. 28, 30, 48 and 50..... 35%
Steel Face Plate Jaws, Nos. 70 and 72 ..... 30%
Westcott Patent Chucks:
Lathe Chucks..... 50%
Little Giant Auxiliary Drill..... 50%
Little Giant Double Grip Drill..50%
Little Giant Drill, Improved..... 50%
Oneida Drill..... 50%
Scroll Combination Lathe..... 50%

Clamps—

Adjustable, Hammers'.....20@20&3%
Carriage Makers', P., S. & W. Co. ..... 50&10%
Besly, Parallel..... 33⅓&10%
Myers' Hay Rack..... 45%
Lineman's Swedish Neverturn..... 65%
Wood Workers, Hammers'.....40&10%
Saw Clamps, see Vises, Saw Filers'.

Cleaners, Drain—

Iwan's Champion, Adjustable..... 50%
Iwan's Champion, Stationary..... 40%

Sidewalk—

Star Socket, All Steel..℔ doz. $4.05 net
Star Shank, All Steel..℔ doz. $3.24 net
W. & C. Shank, All Steel, ℔ doz., 7½ in., $3.00; 8 in., $3.25.

Cleavers, Butchers'—

Foster Bros..... 30%
Fayette R. Plumb..... 30%
L. & I. J. White Co..... 30%

Clippers, Horse and Sheep—

Chicago Flexible Shaft Company:
1902 Chicago Horse, each..$10.75
20th Century Horse, each..$5.00
Lightning Belt Horse, each.$15.00
Chicago Belt Horse, each.$20.00
Stewart's Enclosed Gear Horse, each..... $8.75
Stewart's Patent Sheep Shearing Machine, each..... $12.75
Stewart Enclosed Gear Shearing Machine, No. 8, each..$9.75

} See A

Clips, Axle—

Regular Styles, list July 1, '05. 80&80&10%

Cloth and Netting, Wire

—See *Wire, &c.*

Cocks, Brass—

Hardware list:
Plain Bibbs, Globe, Kerosene, Racking, Liquor, Bottling, &c. .....70@—%
Compression Bibbs..60&10@—%

Coffee Mills—

See *Mills, Coffee.*

Collars, Dog—

Nickel Chain, Walter B. Stevens & Son's list..... 40%
Leather, Walter B. Stevens & Son's list 40%

Compasses, Dividers, &c.

Ordinary Goods.....70&10@75%
Wm. Schollhorn Co.:
Excelsior Dividers..... 60%
Lodi Dividers..... 70&10%

Conductor Pipe,—

L. C. L. to Dealers:

Galvanized		
Galv. Steel.	*Charcoal Iron.*	*Copper. 14, 16&20 oz.*
Eastern:		
70%	50&17½%	45%
Central:		
70&5%	55%	45%
Western and Southern:		
65&10%	50&2½%	40&5%
So. Western		
65&5%	45&5%	40&2½%

Terms, 60 days, 2% cash 10 days. Factory shipments generally delivered.

See also Eave Troughs.

Coolers, Water—

L. & G. Mfg. Co.:

Gal.	2	3	4	6	8
Galvanized, ea.	$1.85	$2.00	$2.25	$2.90	$3.90
Galvanized, Lined, side handles, Gal.	2	3	4	6	8
Each	$1.95	$2.15	$2.40	$3.30	$4.15

White Enameled..... 10%
Agate Lined..... 10%

Coopers' Tools—

See *Tools, Coopers'.*

Coopers' Soldering—

Soldering Coppers, 3 lbs. to pair and heavier, 24@27¢; lighter than 3 lb. to pair.....26@29¢

Cord— Sash—

Braided, Drab.....lb. 35¢
Braided, White, Com., Nos. 8 to 12, 23¢; No. 7, 23½¢; No. 6, 24½¢. In lots of 12 doz. or over, 1 cent less per pound.
Cable Laid Italian, lb., No. 18..37¢
Italian, lb., A, No. 18, 25¢; B, 22¢
Common India.....lb., 11@11½¢
Cotton Sash Cord, Tw'ted.18@20¢
Patent Russia.....lb...20¢
Cable Laid Russia.....lb...21¢
India Hemp, Br'd'd.....lb...21¢
India Hemp, Twisted..lb.13@14¢
Patent India, Twisted...lb...17¢
Pearl Braided, cotton, No. 6, ℔ lb, 27½¢; No. 7, 26½¢; Nos. 8 to 12, 26¢
Eddystone, Braided, Nos. 8 to 12, 26¢; 7, 26½¢; 6, 27½¢.
Harmony Cable Laid Italian, Nos. 7 to 10.....℔ lb 23 ¢
Pullman:
Wire Sash Cord..... 10%
Sash Cord Attachments, per doz..10¢
Samson, Nos. 8 to 12:
Braided, ℔ lb., Drab Cotton, 55¢; Italian Hemp, 40@50¢; Linen, 65¢; White Cotton, 50¢; Spot Cord..... 50¢
Massachusetts, White....℔ lb 40¢
Massachusetts, Drab....℔ lb 45¢
Phoenix, White, Nos. 8 to 12, 27¢;
Silver Lake, per lb.:
A, Drab, 45¢; A, White, 40¢; B, Drab, 40¢; B, White, 35¢; Italian Hemp, 40¢; Linen....57½¢
See also Chain and Ribbon.

} 15%

Wire, Picture—

List July 10, 1906.....90@—%
Hendryx Standard Wire Picture Cord, old list, 85&10%
Turner & Stanton Co. Wire Picture Cord ..... 85&10%

Cradles—

Grain .....40&12½%

Crayons—

White Round Crayons, Cases, 100 gro., $6.50@$7.50 at factory, but lower prices made by jobbers
Zelnicker's Lumber. ℔ gro.
White and Purple, Indelible....$7.50
Blue, Red, Green, Yellow and Terra Cotta, $6.50; Black.....$4.00
Giant Lumber, 5¼ in. x 15-16 in. round, all colors, $16.25; Indelibles $18.75
Genuine Soapstone, Metal Workers', 5 in. x ¼ in. Round, $2.50; 5 in. x ¼ in. Square, $1.75; 5 x ⅛ x 3-16, $2.50; 5 x 1¼ x 3-16..... $3.00

Crooks, Shepherds'—

Fort Madison, per doz., Heavy, $5.50; Light $5.00

Crow Bars—See *Bars, Crow.*

Cultivators—

Victor Garden..... 50%

Cutlery, Table—

International Silver Company:
No. 12 M'd'm Knives, 1847..℔ doz. $3.50
Star, Eagle, Rogers & Hamilton and Anchor ..... ℔ doz. $3.00
Wm. Rogers & Son..... ℔ doz. $2.50

Cutters— Glass—

H. H. Mayhew Co..... 40%
Red Devil..... 60%
B. Mfg. Co..... 40%
Woodward 50%

Meat and Food—

American 30%

Nos.	401	402	403	404	405	406	407
Each	$5	$7	$10	$12	$25	$50	$60

Enterprise:

Nos.	5	10	12	22	32
Each	$2	$3	$2.75	$4.50	$6

25@25&7½%
No. 202. $1.50..... 40&7½%
P., S. & W. Co.:
Dixon's ..... ℔ doz. 33⅓%

Nos.	2	3	4
	$14.00	$17.00	$19.00	$30.00

Ideal ..... 40@40&5%
Hales ..... 60&10&5%
Little Giant..... ℔ doz. 40@50%

Nos.	305	310	312	320	322
	$35.00	$48.00	$44.00	$72.00	$68.00

New Triumph No. 605. ℔ doz. $24.00.. 40&10%
Russwin Food. No. 1. $24.00; No. 2. $27.00 ..... 45&10&10%
$15.00 $18.00
Enterprise Beef Shavers..... 25@30%

Slaw and Kraut—

Henry Disston & Sons:
Slaw and Kraut Cutters..... 35%
Corn Graters..... 30%
J. M. Mast Mfg. Co.:
Slaw Cutters, 1 Knife....℔ doz. $3.00
Combined Slaw Cutter and Corn Grater ..... ℔ doz. $4.00

Tobacco—

All Iron, Cheap..doz. $4.25@$4.50
Enterprise ..... 25@30%
National, ℔ doz., No. 1, $21; No. 2, $18 ..... 40%

Diggers, Post Hole, &c.—

Disston's:
Rapid, ℔ doz., $24.00..... 25%
Samson, ℔ doz., $34.00..... 25%
Iwan's Imp'ved Post Hole Auger..40%
Vaughan Pattern Post Hole Augers, ℔ doz., $7.00
Perfection Post Hole Diggers, ℔ doz. $8.75
Split Handle Post Hole Diggers, ℔ doz., $7.75
Hercules Pattern, ℔ doz..... $10.00
Kohler's, ℔ doz., Universal, $15.00; Little Giant, $12.00; Hercules, $10.00; Invincible, $9.00; Rival, $8.50; Pioneer..... $7.50
Never-Break Post Hole Diggers, ℔ doz., $24.00..... 60%

Dividers—See *Compasses.*

Drawing Knives—

See *Knives, Drawing.*

Dressers, Emery Wheel—

Sterling Emery Wheel Dressers.....35%
Sterling Wheel Dresser Cutters.....35%

Drills and Drill Stocks—

Blacksmiths' Common Drilling Machines .....$1.50@$1.75
Breast, Millers Falls..... 15&10%
Breast, P. S. & W..... 33⅓%
Goodell Automatic Drills.50&10@60&10%
Millers Falls Automatic Drills.33⅓&10%
Ratchet, Curtis & Curtis..... 25%
Ratchet, Parker's..... 40%
Ratchet, Weston's..... 40%
Ratchet, Weston's, Style H Improved 40%
Ratchet, No. 012..... 40%
Ratchet, Celebrated..... 40%
Ratchet, Whitney's, P., S. & W. ..... 50&5%
Whitney's Hand Drill, No. 1, $10.00; Adjustable, No. 10, $12.00.....33⅓%

Twist Drills—

Bit Stock.....60&10&10@70%
Taper and Straight Shank.... 60&10@60&10&5%

Drivers, Screw—

Screw D'ver Bits, per doz..45@50¢
Balsey's Screw Holder and Driver, ℔ doz., 2½-in., $3; 4-in., $7.50; 6-in. ℔ 50%
Buck Bros.' Screw Driver Bits..... 30%
Champion 50%
Disston's 70%
Fray's Hol. H'dle Sets, No. 3, $12..50%
Ford's Brace Screw Drivers.....40&10%
Gay's Double Action Ratchet..... 35%
Goodell's Auto..... 65@65&10%
Mayhew's Black Handle..... 40%
Mayhew's Monarch..... 40%
Millers Falls, Nos. 20 and 21....25&10%
Millers Falls, Nos. 11, 12, 41, 42..15&10%
Smith & Hemenway Co., Neverturn, 66⅔%; Elmora, 60%; Star, 30&10%
Swan's:
Nos. 7565 to 7568, 50%; No. 7540, 40&10%

Eave Trough, Galvanized—

Territory.	*L. C. L. Galvanized*	
Galv. Steel.	*Charcoal Iron.*	*Copper. 14, 16&20 oz.*
Eastern:		
75&5%	60&10%	45%
Central:		
75&10%	65%	45%
Western and Southern:		
75%	60&5%	40&5%
So. Western:		
70&10%	55&7½%	42½%

Terms.—2% for cash. Factory shipments generally delivered.

See also Conductor Pipe and Elbows.

Elbows and Shoes—

Factory shipments, all territories:
Galv. Steel and Galv. C. I.
Standard Gauge..... 80%
No. 26..... 50%
No. 24..... 85%
No. 22..... 10%
Copper ..... 60&10%

Elbows, Stove Pipe—

Edwards, Standard Blue.....40&10&10%
Edwards, Royal Blue..... 40&10&10%
Reeves, Dover, one piece.....40&10%

Emery, Turkish—

	¼ to ½:	¾ to 220:	Flour.
Kegs .....lb.	5 ¢	5¼ ¢	5¼ ¢
½ Kegs.....lb.	5¼ ¢	5¾ ¢	5¾ ¢
¼ Kegs.....lb.	5½¢	6 ¢	6 ¢
10-lb. cans, 10 in case....	6½¢	7 ¢	6 ¢
10-lb. cans, less than 10.....	10 ¢	10 ¢	8 ¢
Less quantity..	10 ¢	10 ¢	8 ¢

NOTE.—In lots 1 to 3 tons a discount of 10% is given.

Extractors, Lemon Juice
—See *Squeezers, Lemon.*

Fasteners, Blind—
Zimmerman's .....50&10%
Walling's .....40&10%
Upson's Patent.....40%

Cord and Weight—
Ives and Titan.....33⅓%

Corrugated—
Acme Corrugated Fasteners.....70%

Faucets—
Cork Lined.....50&10@60%
Metallic Key, Leather Lined, 60&10@70%
Red Cedar.....40&5@40&10&5%
Petroleum .....70&10@75%
B. & L. B. Co.:
Metal Key.....60&10%
Star 60%
West Lock.....50&10%
John Sommer's Peerless Tin Key....40%
John Sommer's Boss Tin Key.....50%
John Sommer's Victor Mtl. Key.50&10%
John Sommer's Duplex Metal Key..60%
John Sommer's Diamond Lock.....40%
John Sommer's I. X. L. Cork Lined...50%
John Sommer's Reliable Cork Lined.. 50&10%
John Sommer's Chicago Cork Lined.60%
John Sommer's O. K. Cork Lined...50%
John Sommer's No Brand, Cedar....50%
John Sommer's Perfection, Cedar....40%
Self Measuring:
Enterprise, ℔ doz. $36.00.....40&10%
Lane's, ℔ doz. $36.00.....40&10%
National Measuring, ℔ doz. $36.40&10%

Felloe Plates—
See *Plates, Felloe.*

Files— Domestic—
List Nov. 1, 1899.
Best Brands.....70&10@75&10%
Standard Brands....75&10@80%
Lower Grade...75&10&10@80&10%

Imported—
Stubs' Tapers, Stubs' list, July 24, '97.....33 1-3@40%

Fixtures, Fire Door—
Allith Underwriters' Approved.....50%
Richards Mfg. Co.:
Universal, No. 103; Special, No. 104 .....$3.75
Fusible Links, No. 96.....50%
Expansion Bolts, No. 107.....60&10%

Grindstone—
Net Prices:

Inch	*15*	*17*	*19*	*21*
Per doz.	*$3.60*	*3.85*	*4.15*	*4.65*

P., S. & W. Co.....25%
Reading Hardware Co.....60%

Fodder Squeezers—
See *Compressors.*

Forks—
NOTE.—Manufacturers are selling from the list of September 1, 1904, but many jobbers are still using list of August 1, 1899, or selling at net prices.
Iowa Dig-Ezy Potato.....60&10%
Victor, Hay.....60&15&2½%
Victor, Manure.....66⅔%
Victor, Header.....65%
Champion, Hay.....66⅔%
Champion, Header.....65%
Champion, Manure.....60&15&2½%
Columbia, Hay.....60&20%
Columbia, Manure.....70%
Columbia, Spading.....70&12½%
Hawkeye Wood Barley.....40%
W. & C. Potato Digger.....60&10%
Acme Hay.....60&20%
Acme Manure, 4 tine.....60&10&5%
Dakota Header.....60&20%
Jackson Steel Barley.....60&20%
Kansas Header.....65%
W. & C. Favorite Wood Barley.....40%
Plated.—See Spoons.

Frames— Wood Saw—
White, S'g't Bar, per doz.75@80¢
Red, S'g't Bar, per doz..$1.00@1.25
Red, Dbl. Brace, per doz.$1.40@1.50

Freezers, Ice Cream—

Qt.	*1*	*2*	*3*	*4*	*6*
Each	*$1.25*	*$1.60*	*$1.90*	*$2.20*	*$2.80*

Fruit and Jelly Presses—
See *Presses, Fruit and Jelly.*

Fry Pans—See *Pans, Fry.*

Fuse— *Per 1000 Feet.*
Hemp $2.75
Cotton 3.20
Waterproof Sgl. Taped..3.65
Waterproof Dbl. Taped..4.40
Waterproof Tpl. Taped..5.15
} 10&5%

Gates, Molasses and Oil—
Stebbins' Pattern.....75@80%

Gauges—
Marking, Mortise, &c..50@50&10%
Chapin-Stephens Co.:
Marking, Mortise, &c.....50&50&10%
Disston's Marking, Mortise, &c..67½%
Wire, Brown & Sharpe's.....33⅓%
Wire, Morse's.....25%
Wire, P., S. & W. Co.....33⅓%

Gimlets— Single Cut—
Numbered assortments, per gro.
Nail, Metal, No. 1, $2.00; 2, $2.30
Spike, Metal, No. 1, $4.00; 2, $4.30
Nail, Wood Handled, No. 1, $2.50; 2, $2.80
Spike, Wood Handled, No. 1, $4.30; 2, $4.60

Glass, American Window
See *Trade Report.*

Glasses, Level—
Chapin-Stephens Co.....65@65&10%

Glue, Liquid Fish—
Bottles or Cans, with Brush.. 25&10@50%
Elwell's 40%

Grease, Axle—
Common Grade....gro. $6.00@6.50
Dixon's Everlasting, 10-lb pails, ea. 85¢; in boxes, ℔ doz., 1 lb, $1.20; 2 lb.....$2.00
Helmet Hard Oil.....25%

Griddles, Soapstone—
Pike Mfg. Co.....33⅓@33⅓&10%

Grinders—
Royal Mfg. Co.:
Alundum Grinding Machines, each, Nos. 01, $1.75; 1A, $2.50; 10, $5.00 .....30%
Alundum Sickle Grinders, each, Nos. 20, $5.00; 20A, $6.00; 20A Combined, $6.50.....30%
Alundum Disc Grinders, each, $2.50 .....30%

Grindstones—
Pike Mfg. Co.:
Improved Family Grindstones, ℔ inch, ℔ doz., $2.00.....33⅓%
Richards Mfg. Co., Eli and Cycle, Ball Bearing, mounted.....40%

Grips, Nipple—
Perfect Nipple Grips.....40&10&2%

Halters and Ties—
Cow Ties.....60&5@60&10%
Covert Mfg. Co.:
Web .....30&2%
Jute Rope.....35%
Sisal Rope.....20%
Cotton Rope.....45%
Hemp Rope.....45%
Oneida Community:
Am. Coil and Halters.....40@40&5%
Am. Cow Ties.....45@60%
Niagara Coil and Halters..45@50&5%
Niagara Cow Ties....45&5@50&10&5%

Hammers—
Handled Hammers—
Heller's Machinists'...55&10@55&10&5%
Heller's Farriers'.....40&5@40&10&5%
Peck, Stow & Wilcox Co.:
Crucible Steel.....50%
Farriers' .....40&10&5%
Riveting 50%
Machinists', revised list.....66⅔&5%
Blacksmiths' .....50&5%
Fayette R. Plumb:
A. E. Nail.....40&2½@40&12½%
Eng. and B. S. Hand.50&10&5@60&5%
Machinists' Hammers.....60@60&10%
Rivet and Tinners'.40&7½@40&12½&5%

Heavy Hammers and Sledges—
Under 3 lb., per lb., 50¢ .80&5@—%
3 to 5 lb., per lb., 40¢ .80&5@—%
Over 5 lb., per lb., 30¢ .....80&10&5@—%
Wilkinson's Smiths'...lb. 9½@10¢

Handles—
Agricultural Tool Handles
Axe, Pick, &c....60&10@60&10&5%
Hoe, Rake, &c.....40%
Fork, Shovel, Spade, &c.:
Long Handles.....40%
D Handles.....40%

Cross-Cut Saw Handles—
Atkins' 40%
Champion 50%
Disston's 50%

Mechanics' Tool Handles—
Auger, assorted...gro.$3.00@$3.50
Brad Awl.....gro. $1.65@$1.75
Chisel Handles, Ass'd, per gro.:
Tanged Firmer, Apple, $2.40@ $2.65; Hickory.....$2.15@2.40
Socket Firming, Apple, $1.75@ $1.95; Hickory....$1.60@$1.75
Socket Framing, Hickory, $1.60@$1.75
File, assorted.....gro. $1.30@$1.40
Hammer, Hatchet, &c. 60&10@60&10&5%
Hand Saw, Varnished, doz. 80&85¢; Not Varnished...65@75¢
Plane Handles:
Jack, doz. 30¢; Jack, Bolted.75¢
Fore, doz. 45¢; Fore, Bolted.90¢
Chapin-Stephens Co.:
Carving Tool.....30@30&10%
Chisel .....60@60&10%
File and Awl.....60@60&10%
Saw and Plane.....30@30&10%
Screw Driver.....30@30&10%
Millers Falls Adj. and Ratchet Auger Handles .....15&10%
Nicholson Simplicity File Handle.... ℔ gro. $0.85@$1.50
W. A. Zelnicker Supply Co.:
Hammer, ℔ doz., 12 in., $2.00; 14 in., $2.00; 16 in., $2.30; 18 in., $2.50; 20 in., $2.70; 22 in., $3.00; 24 in., $3.30; 26 in., $3.50; 30 in., $3.80.
Sledge, ℔ doz., oval, 30 in., $3.80; octagon, 30 in., $3.80; oval, 36 in., $4.00; octagon, 36 in., $4.00.
Axe, ℔ doz., 28 to 34 in., $5.60; 36 in., $5.80.
Adze, ℔ doz., 36 in., $5.80; 36 in., $7.80.
Pick, ℔ doz., R. R., 36 in., $8.00; coal, 34 in., $5.80.
Hatchet, ℔ doz., 12 to 14 in., $2.00.
} 50%

Hangers—
NOTE.—Barn Door Hangers are generally quoted per pair, without track, and Parlor Door Hangers per double set with track, &c.
Allith Mfg. Co.:
Reliable, Nos. 1 and 2; Allith, No. 3; Allith Adjustable, No. 6; Reliable Parlor Door.....50%
Chicago Spring Butt Co.:
Friction 25%
Oscillating 25%
Big Twin.....25%
Chisholm & Moore Mfg. Co.:
Baggage Car Door.....50%
Elevator 30%
Railroad 50%
Cronk & Carrier Mfg. Co.:
Loose Axle.....60&2½%
Roller Bearing.....70&2½%
Griffin Mfg. Co.:
Solid Axle, No. 10, $12.00..60&10%
Roller Bearing, No. 11, $15.00, 60&10%
Roller Bearing, Ex. Hy., No. 22, $18.00.....60&10%
Bull Dog, $24.00.....70%
Lane Bros. Co.:
Parlor, Ball Bearing, $1.00; Standard, $3.15; No. 105, $2.85; New Model, $2.80; New Champion $2.25
Barn Door, Standard.....60&10%
Hinged .....net $6.08
Covered .....60&5%
Special .....70&5%
Lawrence Bros.:
Advance .....55&10%
Cleveland .....70&7½%
Clipper, No. 75.....60%
Crown .....55&10%
Cyclone, No. 40.....net $6.50
Tandem, No. 50.....net $7.50
New York.....55&10%
McKinney Mfg. Co.:
Roller Bearing, Nos. 1 and 2.70%
Anti-Friction 60%
Hinged Hangers, King Charm.60%
Richards Mfg. Co.:
Hangers, Nos. 47, 48, 147, 247, 60&5%
Pioneer Wood Track, No. 3..$2.25
Roller B'r'g St'l Track No. 12.$2.20
Roller B'r'g St'l Track No. 13.$2.50
Roller B'r'g, Nos. 39, 41, 43, 70&7½%
Hero, Adj. Track No. 19..50&10%
Adjustable Track Tandem Trolley Track No. 16.....50&10%
Seal, Steel Track No. 8.....$2.25
Auto Adj. Track No. 22.—50&5%
Trolley B. D. No. 17, $1.25; F. D. No. 120, $2.25; No. 121, $2.45; No. 150.....$2.50
Safety Underwriters F. D. No. 101 .....50%
Tandem No. 41..2½ and 3 60&10%
Palace, Adjustable Track No. 132 .....50&5%
Royal, Adjustable Track No. 122 .....50&10%
Ives' Wood Track No. 1.....$2.25
Trolley B. D. No. 20.....50&10%
Trolley B. D. No. 24, $1.30; No. 27, $1.40; No. 28.....$1.60
Roller Bearings, Nos. 37, 38, 39, 41, 43, 44, Sizes 1 and 2.70&7½%
Anti-friction, No. 42; No. 44, sizes 2½ and 3.....60%
Hinged Tandem No. 48.....60&5%
Folding Door B. B. Swivel No. 135 .....40%
Taylor & Boggis F'y Co.'s Kidder's Roller Bearing.50&15&10&5%
Myers' Stayon Hangers.....60%
} Extra 10% often given.

Hangers— Garment—
Pullman Trouser, ℔ gro., 1 pair Flat Aluminoy, $9.00; 1 pair Round Nickeled, $9.00; 4 pair Round Nickeled, $27.00; 1 pair Flat Gun Metal, $12.00; 1 pair Flat Black Enameled, $7.50; 1 pair Wood Clamp, $13.50; Skirt Hangers, Folding, per gro., $21.00; Coat Hangers, Folding, per gro., $9.00; Garment Hanger Rods, Round Nickeled, per gro., $10.50; Garment Hanger Loops, Round Nickeled, per gro.....$10.50
Victor Folding.....℔ gro. $9.60

Gate—
Myers' Patent Gate Hangers, ℔ doz. net $4.50

Joist and Timber—
Lane Bros. Co.....30%

Hasps—
Griffin's Security Hasp.....50&10%
McKinney's Perfect Hasp, ℔ doz..60%

Hatchets—
Regular list, first qual..40&2½%@—
Second quality.....50&5%@—

Heaters, Carriage—
Clark, No. 5 $1.75; No. 5B, $2.00; No. 3, $2.25; No. 3D, $2.75; No. 7D, $3.00; No. 3E, $3.25; No. 1, $3.50.....25%
Clark Coal, ℔ doz., $0.75.....20%

Hinges—
Blind and Shutter Hinges
Surface Gravity Locking Blind: (Victor; National; 1868 O. P.; Niagara; Clark's O. P.; Clark's Tip; Buffalo.)

No.	*1*	*3*	*5*
Doz. pair	*$0.75*	*1.35*	*2.70*

Mortise Shutter: (L. & P., O. S., Acme, &c.)

No.	*1*	*1½*	*2*	*2½*
Doz. pair	*$0.70*	*.65*	*.60*	*.55*

Mortise Reversible Shutter (Buffalo, &c.):

No.	*1*	*1½*	*2*
Doz. pair	*$0.70*	*.65*	*.60*

North's Automatic Blind Fixtures, No. 2, for Wood, $9.00; No. 3, for Brick, $11.50.....10%
Charles Parker Co.....70&75%
Parker Wire Goods Co.:
Hale & Benjamin Automatic Blind Hinges 20%
Hale's Blind Awning Hinges, No. 110, for wood, $9.00; No. 111, for brick, $9.00.....20%
Reading's Gravity.....60%
Stanley's Steel Gravity Blind Hinges, No. 1647½, ℔ doz. sets, without screws, $0.95; with screws, $1.25.
Wrightsville Hardware Co.:
O. S., Lull & Porter.....75&5%
Acme, Lull & Porter.....75%
Queen City Reversible.....75%
Shepard's Noiseless, Nos. 60, 65, 55 .....75&5%
Niagara, Gravity Locking, Nos. 1, 3 & 5.....75&5%
Tip Pat'n, No. 1.....75&10%
No. 3.....75&5%
Buffalo Gravity Locking, Nos. 1, 3 & 5.....70&10&5%
Shepard's Double Locking.....75%
Champion Gravity Locking.....75&5%
Pioneer .....75&10%
Empire 65%
W. H. Co.'s Mortise Gravity Locking, No. 2.....60&10%

Gate Hinges—

Clark's or Shepard's—Doz. sets:	*No.*	*1*	*2*	*3*
	Hinges with L't'chs.	*$2.00*	*2.70*	*5.00*
	Hinges only.....	*1.40*	*2.05*	*3.80*
	Latches only.....	*.70*	*.70*	*.35*

New England:
With Latch.....doz. ...@$2.00
Without Latch...doz. ...@$1.60
Reversible Self-Closing:
With Latch.....doz. ...@$1.75
Without Latch...doz. ...@$1.35
Western:
With Latch.....doz. $1.75
Without Latch.....doz. $1.15
Wrightsville Hardware Co.: Shepard's or Clark's Hinges and Latches, Hinges only or Latches only, Nos. 1, 2 or 3.....70%

Pivot Hinges—
Bommer Bros. Pivot.....40%
Lawson Mfg. Co. Matchless.....50%

Spring Hinges—
Holdback, Cast Iron...$6.75@$7.00
Non-Holdback, Cast Iron$6.50@$6.75
J. Bardsley:
Bardsley's Non-Checking Mortise Floor Hinges.....40%
Bardsley's Patent Checking.33⅓%
Bommer Bros.:
Bommer Ball Bearing Floor..40%
Bommer Spring Hinges.....40%
No. 999 Wrot. Steel Hold Back, ℔ gr. $9.00
Chicago Spring Butt Co.:
Chicago Spring Hinges.....25%
Triple End Spring Hinges....50%
Chicago (Ball Bearing) Floor..50%
Garden City Engine House....25%
Keene's Saloon Door.....25%
Columbian Hardware Co.:
Acme, Wrought Steel.....30%
Acme, Brass.....25%
American 30%
Columbia, ℔ gr., No. 14, $9.00; No. 18, $25.00
Columbia, Adj., No. 7, ℔ gr. $12.00
Columbian Hinges.....60&10%
Gem, new list.....30%
Clover Leaf.....℔ gr. $12.00
Oxford, new list.....30%
Floor Spring Hinges.....65&10%
Lawson Mfg. Co. Matchless....30%
Richards Mfg. Co.:
Superior Double Acting Floor Hinges 40%
Shelby Spring Hinge Co.:
Buckeye All Steel Holdback Screen Door.....℔ gr. $9.00
Chief Ball Bearing Floor Hinge 50%
Ball Bearing Door.....25%
No. 777, Sheet Steel Holdb'k, ℔ gr. pr.....$9.00
Superior Spring Hinge Co.:
Superior Floor Hinges.....33⅓%
} Extra 10% often given on most of these Hinges.

Wrought Iron Hinges—
Strap and T Hinges, &c., list December 20, 1904:
Light Strap Hinges..50&10%
Heavy Strap Hinges..60&5%
Light T Hinges.....50%
Heavy T Hinges.....40%
Extra Hvy. T Hinges.50&10%
Hinge Hasps.....33⅓%
Cor. Heavy Strap...60&5%
Cor. Ex. Heavy T...50&10%
} Extra 10&7½%

Screw Hook and Strap.
6 to 12 in..lb. 8½¢
14 to 20 in..lb. 8½¢
22 to 36 in..lb. 8½¢

Screw Hook and Eye:
¾ to 1 inch.....lb. 6½¢
⅝-inch.....lb. 7½¢
½-inch .....lb. 8½¢

Hitchers, Stall—
Covert Mfg. Co., Stall Hitchers..30&2%

Hods— Coal—
M'f'gr's list, price per gross.

Inch	*15*	*16*	*17*	*18*
Galv. Open	*$35*	*$39*	*$42*	*$46*
Jap. Open	*26*	*28*	*31*	*35*
Galv. Funnel	*43*	*48*	*52*	*56*
Jap. Funnel	*33*	*36*	*39*	*43*

} 20&10%

Masons' Etc.
Cleveland Wire Spring Co.:
Steel Brick, No. 162.....each $1.05
Steel Mortar, No. 158.....each $1.35

Hoes— Eye—
Scovil and Oval Pattern..... 60&10@60&10&10%
Grub, list Feb. 23, 1899..... 70&10@75&10%

D. & H. Scovil.....27½%
Am. Fork & Hoe Co. (Scovil Pattern) 60%

Handled—

NOTE.—Manufacturers are selling from the list of September 1, 1904, but many jobbers are still using list of August 1, 1899, or selling at net prices.

Cronk's Weeding, No. 1, $2.00; No. 2, $2.50
Star Double Bit.....$3.20
Ft. Madison Cotton Hoe....70&10&10%
Ft. Madison Crescent Cultivator Hoe, ₱ doz.....70&10%
Ft. Madison Mattock Hoes:
Regular Weight.....₱ doz. 40&5%
Junior Size.....₱ doz. $4.00
Ft. Madison Sprouting Hoe, ₱ doz., 60&10%
Ft. Madison Dixie Tobacco Hoe..... 75&10&7½%
Kretsinger's Cut Easy.....70&10%
Warren Hoe.....45&10%
W. & C. Ivanhoe.....75&2%
B. B. 6 in., Cultivator Hoe.....$3.40
B. B., 6½ in.....$3.50
Acme Wedding.....₱ doz., net, $4.35
W. & C. L'tning Shuffle Hoe, ₱doz.$5.25

Hoisting Apparatus—

See *Machines, Hoisting.*

Holders— Bit—

Angular, ₱ doz. $24.00.....45&10%

Door—

Bardsley's, Iron, 40%; Brass and Bronze 25%
Empire 50%
Pullman 35%
Richards Mfg. Co.: No. 117, Ever-ready, 40%; Nos. 118, 119, Sure Grip 50%
Superior 33⅓%

File and Tool—

Nicholson File Holders and File Handles .....33⅓@40%

Fruit Jar—

Triumph Fruit Jar Holder, ₱ gross, $10.80; ₱ doz.....$1.25

Trace and Rein—

Fernald Double Trace Holder, ₱ doz. pairs $1.25
Dash Rein Holder, ₱ doz. pairs. $1.25

Hones—Razor—

Pike Mfg. Co., Belgian and Swaty, 50%; German.....33⅓%

Hooks—Cast Iron—

Bird Cage, Reading.....40%
Clothes Line, Reading List.....40%
Coat and Hat, Reading.....45&20%
Coat and Hat, Wrightsville.....60&5%
Harness, Reading List.....40%

Wire—

Belt 80%
Wire C. & H. Hooks....75@—%
Bradley Metal Clasp Wire, Coat and Hat, 70&10%; Ceiling.....70&10%
Columbian Hdw. Co., Gem.....70&5%
Parker Wire Goods Co., King..70&10%
Wire Goods Co.:
Acme, 60&10%; Chief, 70%; Crown, 75%; Czar, 65%; V Brace, 75%; Czar Harness, 50&10%.

Wrought Iron—

Box, 6 in., per doz., $1.00; 8 in., $1.25; 10 in., $1.50.
Cotton .....doz. $1.05@$1.25
Wrought Staples, Hooks, &c.—
See Wrought Goods.

Miscellaneous—

Hooks, Bench, see *Stops, Bench.*
Hooks, Bush, Light, doz., $6.20; Medium, $6.75; Heavy, $7.65
Grass, best, all sizes, per doz.$3.00
Grass, common grades, all sizes, per doz.....$1.50
Whiffletree .....lb. 5¾@6¢
Hooks and Eyes:
Brass .....60@60&10%
Malleable Iron.....70@70&10%
Covet Mfg. Co. Gate and Scuttle Hooks 40%
Ft. Madison Cut-Easy Corn Hooks, ₱ doz. $3.25 net
Turner & Stanton Co. Cup and Shoulder .....80&10%
Bench Hooks—See Bench Stops.
Corn Hooks—See Knives, Corn.

Horse Nails—

See *Nails, Horse.*

Horseshoes—

See *Shoes, Horses.*

Hose, Rubber—

Garden Hose, ¾-inch:
Competition .....ft. 5@ 6¢
3 ply Guaranteed.....ft. 8@ 9¢
4 ply Guaranteed.....ft. 10@11¢
Cotton Garden, ¾-in., coupled:
Low Grade.....ft. 8@ 9¢
Fair Quality.....ft. 10@11¢

Irons— Sad—

From 4 to 10.....lb. 3@3½¢
B. B. Sad Irons.....lb. 3½@3½¢
Mrs. Potts', cents per set:

	Nos. 50	55	60	65
Jap'd Tops	83	80	93	91
Tin'd Tops	88	85	98	95

New England Pressing..lb.3¾@4¢

Bar and Corner—

Richards Mfg. Co., Bar, 60&10%; Corner 60%

Pinking—

Pinking Irons.....doz.60¢

Irons, Soldering

See *Coppers.*

Jacks, Wagon—

Covert Mfg. Co.:
Auto Screw.....30&2%; Steel, 45%
Lockport 50%
Lane's Steel.....30&5%
Richards' Tiger Steel, No. 130...50&10%
Smith & Hemenway Co.'s.....25%

Ladder—

Richards Mfg. Co., Ladder Jacks..50%

Kettles—

Brass, Spun, Plain.....20@25%
Enameled and Cast Iron—See Ware, Hollow.

Knives—

Butcher, Kitchen, &c.—

Foster Bros.' Butcher, &c.....30%
Wilkinson Shear & Cutlery Co.....60%

Corn—

Columbian Cutlery Co., Wilcut Brand Knives and Hooks.....60%
Withington Acme, ₱ doz., $2.65; Dent, $2.75; Adj. Serrated, $2.20; Serrated, $2.10; Yankee No. 1, $1.50; Yankee No. 2, $1.15.

Drawing—

Standard List.....75&5@75&10%
C. E. Jennings & Co., Nos. 45, 46, 25&7½%
Jennings & Griffin, Nos. 41, 42, 66⅔&7½%
Swan's .....66⅔@70%
Watrous 16⅔%
L. & I. J. White.....20&5@25%

Hay and Straw—

Serrated Edge, per doz.$5.50@5.75
Iwan's Sickle Edge.....₱ doz. $9.50
Iwan's Serrated.....₱ doz. $10.00

Miscellaneous—

Farriers' .....doz. $3.00@3.25
Wostenholm's .....₱ doz. $3.00@3.25

Knobs—

Base, 2½-inch, Birch, or Maple, Rubber Tip.....gro.$1.25@$1.40
Carriage, Jap., all sizes..... gro. 40@45¢
Door, Mineral.....doz. 65@70¢
Door, Por. Jap'd.....doz. 70@75¢
Door, Por. Nickel..doz. $2.05@$2.15
Bardsley's Wood Door, Shutters, &c.15%

Lacing, Leather—

See *Belting, Leather—*

Ladders, Store, &c.—

Allith Mfg. Co., Reliable.....50%
Lane's Store.....25%
Myers' Noiseless Store Ladders....50%
Richards Mfg. Co.:
Improved Noiseless, No. 112.....50%
Climax Shelf, No. 113.....50%
Trolley, No. 109.....50%

Ladies, Melting—

L. & G. Mfg. Co. (low list).....20%
P. S. & W.....40&10%
Reading 60%

Lanterns—Tubular—

Regular, No. 0.....doz.$4.35@4.50
Side Lift, No. 0.....doz.$4.60@4.75
Hinge Globe, No. 0.doz.$4.60@4.75
Other Styles.....40@40&10%

Bull's Eye Police—

3-inch .....$4.25@4.50

Latches— Thumb—

Roggin's Latches, with screw.. doz. 35@40¢

Door—

Allith Mfg. Co., Reliable and Allegator, 50%; Reliable Cold Storage, 50%
Cronk & Carrier Mfg. Co., No. 101, ₱ doz. $2.90
Richards' Bull Dog, Heavy, No. 125 .....50&5%
Richards' Trump, No. 127.....$1.50

Leaders, Cattle—

Small.....doz. 50¢; large, 60¢
Covert Mfg. Co.:
Cotton, 45%; Hemp, 45%; Jute, 35%; Sisal, 20%.

Leathers, Pump—

See *Pumps—*

Lifters, Transom—

R. & E.....10%

Lines—

Wire Clothes, Nos.	*18*	*19*	*20*
100 feet	*$2.50*	*2.25*	*2.00*
75 feet	*$2.10*	*1.80*	*1.65*

Lawson Cordage Works:
Solid Braided Chalk, Nos. 0 to 3..40%
Solid Braided Masons'.....30%
Silver Lake Braided Chalk, No. 0, $6.00; No. 1, $6.50; No. 2, $7.00; No. 3, $7.50.....₱ gr. 20%
Masons' Lines, Shade Cord, &c.:
White Cotton, No. 3½, $1.50; No. 4, $2.00; No. 4½, $2.50; Colors, No. 3½, $1.75; No. 4, $2.25; No. 4½, $2.75; Linen, No. 3½, $2.50; No. 4, $3.50; No. 4½, $4.50.....20%
Tent and Awning Lines: No. 5, White Cotton, $7.50; Drab Cotton, $8.50 .....20%
Clothes Lines, White Cotton: 50 ft., $2.75; 60 ft., $3.25; 70 ft., $3.75; 75 ft., $4.00; 80 ft., $4.25; 90 ft., $4.75; 100 ft., $5.25.....20%
Turner & Stanton Co.:
Solid Braided Chalk, Masons' and Awning Lines.....40%
Clothes Lines, White Cotton.....20%
Shade Cord, Cotton or Linen....20%

Locks— Cabinet—

Cabinet Locks.....33⅓%

Door Locks, Latches, &c—

NOTE.—Net Prices are very often made on these goods.
Reading Hardware Co.....40%
R. & E. Mfg. Co.....10%

Padlocks—

R. & E. Mfg. Co. Wrought Steel and Brass .....75&10%

Sash, &c.—

Ives' Patent:
Bronze and Brass, 55&5%; Crescent, 60%; Iron, 60%; Window Ventilating, 40&20%; Robinson Pat. Ventilating Sash Lock, 33⅓%.
Pullman Patent Ventilating Lock..35%
Reading Sash Locks.....40%

Machines—Boring—

Com. Upr't, without Augers. $2.00@2.25
Com. Angl'r, without Augers, $2.25@2.50
Swan's Improved.....40&10%
Jennings', Nos. 1 and 4.....25&7½%
Millers' Falls.....5.75
Snell's, Upright, $2.65; Angular, $2.90

Corking—

Reisinger Invincible Hand Power.... ₱ doz. $18.00

Fence—

Williams' Fence Machines....each, $5.50

Hoisting—

Moore's Anti-Friction Chain Hoist.30%
Moore's Hand Hoist, with Lock Brake 20%
Moore's Cyclone, High Speed Chain Hoist 25%

Ice Cutting—

Chandler's 12½%

Washing

Boss Washing Machine Co.:	Per doz.
Boss No. 1	$57.00
Boss Rotary	$57.00
Champion Rotary Banner No. 1	$57.00
Standard Champion No. 1	$50.00
Standard Perfection	$27.00
Cincinnati Square Western	$33.00
Uneeda American, Round	$33.60

Mallets—

Hickory .....45&5@50%
Lignumvitæ .....45&5@50%
Tinners' Hickory and Applewood .....doz. 45&5@50%

Mangers, Stable—

Swett Iron Works.....50%

Mats, Door—

Acme Flexible Steel.....50%
Elastic Steel (W. G. Co.), new list.50%

Mattocks—

See *Picks and Mattocks.*

Milk Cans—See *Cans, Milk.*

Mills, Coffee, &c.—

Enterprise Mfg. Co.....20@25%
National list Jan. 1, 1902.....30%
Parker's Columbia and Victoria...33⅓%
Parker's Box and Side.....50&10%
Swift, Lane Bros. Co.....30%

Motors, Water—

Divine's Red Devil.....30%
Lippincott's 30%

Mowers, Lawn—

NOTE.—Net prices are generally quoted
Cheapest.....all sizes, $1.85@2.00
Cheap .....all sizes, $2.00@2.50
Better Grade..all sizes, $2.50@4.50

	12	*14*	*16*	*18-in.*
High Grade....	*$4.50*	*4.75*	*5.00*	*5.25*

Continental 60%
Great American.....70%
Great American Ball B'r'g, new list.70%
Quaker City.....70%
Pennsylvania.....60%
Pennsylvania, Jr., Ball Bearing, 50&10&5%
Pennsylvania Golf.....50%
Pennsylvania Horse.....33⅓&5%
Pennsylvania Pony.....40&5%
Granite State:
Style A, Low Wheel.....70%
Style B, Low Wheel.....70%
Style C, High Wheel, spcl, list, 70&10%
Style D, High Wheel, spcl, list..70%
Philadelphia:
Styles M., S., C., K., T....70&10&5%
Style A, all Steel.....60&10&5%
Style E, High Wheel.....70&10&5%
Drexel and Gold Coin, special list.40%
Horse .....40&5%
Pony .....40&5%
36-in. Horse.....30&10%
Eagle Horse.....30&5%
I. X. L. Horse.....50%

Nails—

Wire Nails and Brads, Miscellaneous .....87½@87½&10%
Cut and Wire. See *Trade Report.*
Hungarian, Finishing, Upholsterers' &c. See *Tacks.*

Horse—

Nos.	6	7	8	9	10	
Anchor	23	21	20	19	18	...40&5%
Coleman	13	12	12	11	11	.....net
New Haven..	23	21	20	19	18	...40&5%
Livingston ..	19	18	17	16	16	....10%

Western .....₱ lb 8½¢
Jobbers' Special Brands..... per lb.9@10¢

Picture—

	1½	*2*	*2½*	*3*	*in.*
Brass H'd.	*.45*	*.55*	*.60*	*.70*	*.. gro*
Por. Head...	*1.10*	*1.10*	*1.10*	*..*	*gro*

Nippers—

See *Pliers and Nippers.*

Nuts—

Cold Punched: Off list.
Square, Blank or Tapped.4.80¢
Hexagon, Blank or Tapped.5.10¢
Square, Bl'k, C., T. & R...5.10¢
Hexagon, Bl'k, C., T. & R.5.70¢
Hot Pressed:
Square, Blank.....5.30¢
Hexagon, Blank.....5.70¢
Square, Tapped.....5.20¢
Hexagon, Tapped.....5.60¢

Oakum—

Best .....lb., 6½¢
U. S. Navy.....lb., 6¢
Navy .....lb., 5¢
Plumbers' Spun Oakum..2¾@3¢

Oil Tanks—See *Tanks, Oil.*

Oilers—

Steel, Copper Plated.....75%
Chase or Paragon:
Brass and Copper.....50&10%
Zinc .....65&10%
Malleable, Hammers' Improved, Nos. 11, 12 and 13, 20%; Old Pattern, Nos. 1, 2, 3, 50%.
American Tube & Stamping Co.:
Spring Bottom Cans.....70@70&10%
Railroad Oilers, &c.....60@60&10%

Openers— Can— *Per doz.*

Sprague, Iron Handle....30@35¢
Sprague, Wood Handle...35@40¢
Sardine Scissors.....$1.75@$3.00
Yankee Can and Bottle Opener, ₱ doz., net, $0.75; Little Gem, ₱ doz., net.....$0.65

Egg—

Hartigan Nickel Plate, ₱ doz., $2.00; Silver Plate, $4.00.

Packing—

Asbestos Packing, Wick and Rope .....20@25¢

Rubber—

(Fair quality goods.)

Sheet, C. I.....11@12¢
Sheet, C. O. S.....11@12¢
Sheet, C. B. S.....12@13¢
Sheet, Pure Gum.....40@45¢
Sheet, Red.....40@50¢
Jenkins' '96, ₱ lb. 80¢.....25%

Miscellaneous—

American Packing...lb. 7@10 ¢
Cotton Packing.....lb. 16@25 ¢
Italian Packing.....lb. 9@12½¢
Jute .....lb. 4@ 4½¢
Russia Packing.....lb. 8@11 ¢

Pails, Water, Well, &c.—

See *Buckets.*

Pans— Dripping—

Standard List.....65&7½@70%
Edwards, Royal Blue.....65&7½%

Fry—

Common Lipped:

Nos.	*1*	*2*	*3*	*4*	*5*
Per doz..	*$0.75*	*0.80*	*0.90*	*1.10*	*1.30*

Refrigerator, Galva.—

Inch	*12*	*14*	*16*	*18*
Per doz....	*$1.75*	*2.25*	*2.80*	*3.15*

Paper—Building Paper

Asbestos: lb.
Roll Board or Building Felt, 6 to 30 lb., per 100 sq. ft.3½to5¢
Roll Board or Building Felt, 3-32 and ⅛ in., 45 to 60 lb., per 100 sq. ft.....6¢
Mill Board, Sheet, 40 x 40 in., 1-32 to ½ in.....3@5¢
Per roll
Rosin Sized Sheathing: 500 sq. ft. Light weight, 25 lbs. to roll 48@58¢
Medium weight, 30 lbs. to roll. 56@70¢
Heavy weight, 40 lbs. to roll.. 75@78¢
Black Water Proof Sheathing, 500 sq. ft., 1 ply, 65¢; 2 ply, 85¢; 3 ply, $1.10; 4 ply, $1.25.
Deafening Felt, 9, 6 and 4½ sq. ft. to lb. ton.....$54.50
Red Rope Roofing, 250 sq. ft. per roll.....$1.75

Tarred Paper—

1 ply (roll 400 sq. ft.), ton.... $34.00@$38.00
2 ply, roll 108 sq. ft.....65¢
3 ply, roll 108 sq. ft.....88¢
Slater's Felt (roll 500 sq. ft.) .80¢

Sand and Emery—

Flint Paper and Cloth.50&10@—%
Garnet Paper and Cloth...25%
Emery Paper and Cl'h..50&10@60%

Parers— Apple—

Goodell Co.:
Family Bay State.....₱ doz. $15 00
Improved Bay State.....₱ doz. $36.00
New Lightning.....₱ doz. $7.00
Turn Table '98.....₱ doz. $6.00
White Mountain.....₱ doz. $5.00
Bonanza Improved.....each $7.50
Dandy .....each $10.00
Eureka Improved.....each $20.00
New Century.....each $20.00
Ranger .....each $25.00
Livingston Nail Co.:
Daisy .....₱ doz. $4.00
Little Star.....₱ doz. $5.00
Rocking Table.....₱ doz. $6.20
Reading Hardware Co.:
Advance .....₱ doz. $4.00
Baldwin .....₱ doz. $4.00
Reading 72.....₱ doz. $3.25
Reading 78.....₱ doz. $6.25

Potato—

Saratoga .....₱ doz. $7.00
White Mountain.....₱ doz. $6.00

Picks and Mattocks—

List, Feb. 23, 1899.70&10@70&10&5%
Cronk's Handled Garden Mattock, ₱ doz., No. 2, $2.60; No. 3, $6.40.

Pinking Irons—
See *Irons, Pinking.*

Pins, Escutcheon—
Brass .....50@50&10%
Iron, list Nov. 11, '85..60@60&10%

Pipe, Cast Iron Soil—
Standard, 2-6 in.....60&10@—%
Extra Heavy, 2-6 in..70&10@—%
Fittings, Standard and Heavy, 75&10@—%

Pipe, Merchant—

	Consumers, Carloads. Steel. Blk.	Galv.	Iron. Blk.	Galv.
	%	%	%	%
¼ & ¼ in...64	48	57	41	
⅜ in.....66	52	59	41	
½ in.....68	56	61	49	
¾ to 6 in....72	62	66	56	
7 to 12 in....69	54	61	46	

Pipe, Vitrified Sewer—
Carload lots.
Standard Pipe and Fittings, 3 to 24 in., f.o.b. factory:
First-class 82%
Second-class 85%

Pipe, Stove—

Per 100 joints.	C. L.	L. C. L.
Edwards' Nested:		
5 in., Standard Blue....	$6.25	$7.25
6 in., Standard Blue....	6.75	7.75
7 in., Standard Blue....	7.75	8.75
5 in., Royal Blue.....	7.00	8.00
6 in., Royal Blue.....	7.50	8.50
7 in., Royal Blue.....	8.50	9.50
Wheeling Corrugating Co.'s Nested:		
5 in., Uniform Color..	$6.15	$7.15
6 in., Uniform Color..	6.65	7.65
7 in., Uniform Color..	7.65	8.65

Planes and Plane Irons—
Wood Planes—
Bench, first qual.....30@30&10%
Bench, second qual...40@40&10%
Molding .....25@25&10%
Chapin-Stephens Co.:
Bench, First Quality.....30%
Bench, Second Quality.....40%
Molding and Miscellaneous.....25%
Toy and German.....30%
Union 60%

Iron Planes -
Chaplin's Iron Planes.....50&10%
Union 60%

Plane Irons—
Wood Bench Plane Irons, list Dec. 12, '06.....25%
Buck Bros.....30%
Chapin-Stephens Co.....25%
Union 50%
L. & I. J. White.....25&5@25%

Planters, Corn, Hand—
Kohler's Eclipse.....₱ doz. $8.00

Plates—
Felloe .....*lb.* 4@4¼¢

Pliers and Nippers -
Button Pliers....75&5@75&10&5%
Gas Burner, per doz., 5 in., $1.25 @ $1.30; 6 in., $1.45 @ $1.50.
Gas Pipe.. 7 8 10 12-in.
$2.00 $2.25 $2.75 $3.50
Acme Nippers.....50&5%
Cronk & Carrier Mfg. Co.:
American Button.....80%
Improved Button.....75&10%
Cronk's 60%
No. 80 Linemen's.....50%
Stub's Pattern.....45%
Combination and others.....33⅓%
Heller's Farriers' Nippers, Pincers and Tools.....40&5@40&10&5%
P., S. & W. Tinners' Cutting Nippers 60%
Wm. Schollhorn Co.:
Bernard, 35%; Elm City, 35%; Paragon, 50%; Lodi, 55%.
Swedish Side, End and Diagonal Cutting Pliers.....50%
Utica Drop Forge & Tool Co.:
Pliers and Nippers, all kinds.....40%

Plumbs and Levels—
Chapin-Stephens Co.:
Plumbs and Levels.....30@30&10%
Chapin's Imp. Brass Cor..40@40&10%
Pocket Levels.....30@30&10%
Extension Sights.....30@30&10%
Machinists' Levels.....40@40&10%
Disston's Plumbs and Levels....60&10%
Disston's Pocket Levels.....60&10%
Stanley's Duplex.....33⅓%
Woods' Extension.....33⅓%

Points, Glaziers'—
Bulk and 1-lb. papers...lb. 9½¢
½-lb. papers.....*lb.* 10 ¢
¼-lb. papers.....*lb.* 10½¢

Police Goods—
Manufacturers' Lists...25@25&5%
Tower's 25%

Polish—Metal, Etc—
Prestoline Liquid, No. 1 (¼ pt.), ₱ doz., $3.00; No. 2 (1 qu.), $9.00..40%
Prestoline Paste.....60%
George William Hoffman:
U. S. Metal Polish Paste, 3 oz. boxes, ₱ doz. 50¢; ₱ gro. $4.50; ½ lb boxes, ₱ doz. $1.25; 1 lb boxes, ₱ doz. $2.25.
U. S. Liquid, 8 oz. cans, ₱ doz., $1.25.
Barkeepers' Friend Metal Polish, ₱ doz., $1.75.

Stove—
Black Eagle Benzine Paste, 5 lb cans, ₱ lb 10¢
Black Eagle, Liquid, ¼ pt. cans,: ₱ doz. 75¢
Black Jack Paste, ¾ lb cans, ₱ gr. $9.00
Black Kid Paste, 5 lb can....each, $0.65
Ladd's Black Beauty Liquid, per 100 tins.....$6.75
Joseph Dixon's, ₱ gr. $5.75.....10%
Dixon's Plumbago.....₱ lb 8¢
Fireside .....₱ gr. $2.50
Gem, ₱ gr. $4.50.....10%
Japanese .....₱ gr. $3.50
Jet Black.....₱ gr. $3.50
Peerless Iron Enamel, 10 oz. cans,. ₱ doz. $1.50

Poppers, Corn—
1 qt. Square..doz.$0.88; gro.$8.75
1 qt. Round..doz.$1.00; gro.$10.00
1½ qt. Square..doz.$1.10; gro.$11.00
2 qt. Square...doz.$1.35; gro.$13.50

Post Hole and Tree Augers and Diggers—
See also *Diggers, Post Hole, &c.*

Posts, Steel—
Steel Fence Posts, each, 5 ft., 42¢; 6 ft., 46¢; 6½ ft., 48¢.
Steel Hitching Posts.....each $1.30

Potato Parers—
See *Parers, Potato.*

Pots, Glue—
Enameled .....*35&10%*
Tinned .....*30&10%*

Powder—
In Canisters:
Duck, 1 lb.....*each 45¢*
Fine Sporting, 1 lb....*each 75¢*
Rifle, ½-lb.....*each 15¢*
Rifle, 1-lb.....*each 25¢*
In Kegs:
12½-lb. kegs.....*$3.50*
25-lb. kegs.....*$4.50*
King's Semi-Smokeless:
Keg (25 lb bulk).....$6.50
Half Keg (12½ lb bulk).....$3.50
Quarter Keg (6¼ lb bulk).....$1.90
Case 24 (1 lb cans bulk).....$8.50
Half case (1 lb cans bulk).....$4.50

King's Smokeless:	Shot Gun.	Rifle.
Keg (25 lb bulk).....	$12.00	$15.00
Half Keg (12½ lb bulk)...	6.25	7.75
Quarter Keg (6¼ lb bulk).	3.25	4.00
Case 24 (1 lb cans bulk)..	14.00	17.00
Half case 12 (1 lb c. bk)..	7.25	8.75

Presses—
Fruit and Jelly—
Enterprise Mfg. Co.....20@25%

Seal Presses—
Morrill's No. 1, ₱ doz., $20.00.....50%

Pruning Hooks and Shears
See *Shears.*

Pullers, Nail—
Cyclops 50%
Miller's Falls, No. 3, ₱ doz., $12.00.. 33⅓&10%
Morrill's No. 1, Nail Puller, ₱ doz. $20.00 .....50%
Pearson No. 1, Cyclone Spike Puller, each $30.00.....50%
The Scranton Co. Case Lots:
No. 2B (large).....$5.50
No. 3B (small).....$5.00
Smith & Hemenway Co.:
Diamond B.....70%
Giant 50%
Staple Pullers, Utica and Davison 60%

Pulleys, Single Wheel—

Inch	1½	1¾	2	3
Awning or Tackle, doz.	$0.30	.45	.60	1.05

Hay Fork, Swivel or Solid Eye. doz., ¼ in., $1.25; 5 in., $1.55				
Inch	2	2¼	2½	
Hot House, doz.	$0.65	.85	1.20	
Inch	1¼	1½	1¾	2
Screw, doz.	$0.16	.19	.23	.30
Inch	1¾	2	2¼	2½
Side, doz.	$0.25	.40	.55	.60
Inch	1¼	1¾	2	2½

Sash Pulleys—
Common Frame; Square or Round End, per doz, 1¾ and 2 in.....*17@20¢*
Auger Mortise, no Face Plate per doz., 1¾ and 2 in....*20@21c*
Acme, No. 35..1¾ in., 19¢; 2 in., 20½¢
American Pulley Co.:
Wrought Steel American Plain Axle .....50&10%
Wrought Steel, Eagle.....17@20¢
Fox-All-Steel, Nos. 3 and 7, 2 in.... ₱ doz. 50%
Grand Rapids All Steel Noiseless..50%
Niagara, No. 25, 1¾ in., 19¢; 2 in.....20½¢
No. 26, Troy..1¾ in., 14½¢; 2 in., 16½¢
Star, No. 26..1¾ in., 19¢; 2 in., 20½¢
Tackle Blocks—See Blocks.

Pumps—
Cistern *60%*
Pitcher Spout.....*75&5@75&10%*
Wood Pumps, Tubing, &c....*50%*
Barnes Dbl. Acting (low list)....40&5%
Barnes Pitcher Spout.....75&10%
Contractors' Rubber Diaphragm No. 2, R. & L. Block Co.....$18.00
Daisy Spray Pump.....₱ doz. $6.50
Flint & Walling's, Fast Mail Hand, (low list).....50%
Flint & Walling's Fast Mail (low list) 50%
Flint & Walling's Tight Top Pitcher. .....75&10%
National Specialty Mfg. Co., Measuring, Nos. 2, $6.00; 3, $5.50.....30%
Myers' Pumps (low list).....40&5%
Myers' Power Pumps.....40&5%
Myers' Spray Pumps.....40&5%

Pump Leathers—
Plunger and Valve Leathers—Per gro.:

No.....	2	2½	3	3½	4
	$3.10	3.70	4.35	4.95	5.60

Cup Leathers—Per 100:				
Inch.....	2½	3	3½	4
	$3.80	4.75	6.20	8.80

Punches—
Saddlers' or Drive, good..... *doz. 50@75¢*
Spring, single tube, good quality *$1.75*
Revolving (4 tubes)....*doz.$3.60*
Bemis & Call Co.'s Cast St'l Drive.50%
Morrill's Nos. 1AA, 1A, 1B, 1C, 1D, $15.00.....50%
Hercules, 1 die, each $5.00.....50%
Niagara Hollow Punches.....40%
Niagara Solid Punches.....55&10%
Wm. Schollhorn Co.:
Belt and Ticket, Bernard, 35%; Paragon, 50%; Lodi.....55%
Tinners' Hollow, P., S. & W. Co..40%
Tinners' Solid, P., S. & W. Co., ₱ doz., $1.44.....40%

Rail—Barn Door, &c.—
Sliding Door, Painted Iron.... *2½@2¾¢*
Sliding Door, Wrought Brass, 1½ in., lb., 36¢.....*30%*
Allith Mfg. Co.: Reliable Hanger Track 50%
Cronk's:
Double Braced Steel Rail..₱ ft. 3¼¢
O. N. T. Rail.....$3.12
Griffin's:
xxx, ₱ 100 ft., 1 x 3-16 in., $3.25; 1¼ x 3-16 in., $3.75.
Hinged Hanger, ₱ 100 ft., 1 x 3-16 in., $3.50; 1¼ x 3-16 in., $4.00.
Lane's:
Hinged Track, ₱ 100 ft. $3.45
O. N. T., ₱ 100 ft., 1 in., $3.00; 1¼ in., $3.45; 1½ in., $4.00.
Standard, 1¼ in.....₱ 100 ft. $4.00
Lawrence Bros.:
1 x 3-16 in., ₱ 100 ft., $7.50; 1¼ x 3-16 in., $8.75.....55&7½%
McKinney's:
Hinged Hanger Track, ₱ ft., 11¢. 60&5%
1 x 3-16 Track.....55&7½%
Myers' Stayon Track.....60&5%
Richards' Mfg. Co.:
Common, 1 x 3-6 in., $3.00; 1¼ x 3-16, $3.25; 1¼ x 3-16, $3.50.
Special Hinged Hanger Rail...60&10%
Lag Screw Rail, No. 65.....50%
Gauge Trolley Track, ₱ ft., No. 31, 9¢; No. 32, 11¢; No. 33, 20¢
No. 50.....60&10%
Nos. 61, $3.00; 62, $3.25; 63, $3.50; 64, $4.00; 45, $3.25; 46, $3.50; 49, No. 1, $3.25; 49, No. 2, $3.50.

Rakes—
NOTE.—Many goods are sold at net prices.
Fort Madison Red Head Lawn....$3.25
Fort Madison Blue Head Lawn....$2.70
Cronk's:
Steel Garden: Champion, 75%; Ideal, 80%; Victor.....80&25%
Queen City Lawn, ₱ doz., 20 teeth, $2.85; 24, $3.00.....net
Auticlog Lawn, ₱ doz.....$4.00
Malleable Garden.....70&10%
Ideal Steel Garden, ₱ doz., 12 teeth, $15.00; 14, $16.00; 16, $18.00.....80%
Kohler's:
Lawn Queen, 20-tooth....₱ doz. $3.15
Lawn Queen, 24-tooth....₱ doz. $3.25
Paragon, 20-tooth.....₱ doz. $2.70
Paragon, 24-tooth.....₱ doz. $2.75
Steel Garden, 14-tooth....₱ doz. $2.40
Malleable Garden, 14-tooth, ₱ doz. $2.00@2.25

Rasps, Horse—
Disston's 75%
Heller Bros.'.....70&5@70&10&5%
Liveright Bros.' Gold Medal.70&10@75%
McCaffrey's American Standard. .....60&10&5%
New Nicholson.....70&10@75%
See also Files.

Razors—
Liana Bo-ras-ic.....60%
Fox Razors, ₱ doz., No. 42, $18.00; No. 44, $20.00; No. 82, Platina, $25.00 } Plain 40%
Red Devil.....65%

Reels, Fishing—
Hendryx:
M 6, Q 6, A 6, B 6, M 9¼, M 16, Q 16, A 16, B 16, 4008, Rubber, Populo, Nickeled Populo.....20%
Aluminum, German Silv., Bronze.25%
1240 N, 124 N.....20%
3004 N, 06 N, 6 RM, G 9.....25%
4 N, 6 PN, 24 N, 26 PN.....20%
2904 P, 33⅓%; 2904 PN, 33⅓%; 0924 N, 33⅓%; 02084 N, 33⅓%; 002904 PN, 33⅓%; 802 N, 33⅓%.....25%
966 PN, 2904 N, 974 PN.....25%
5009 PN, 5009 N.....20%
Competitor, 102 P, 102 PN, 202 P, 202 PN, 102 PR, 202 PR.....20%
304 P, 304 PN, 00304 P, 00304 PN.33⅓%

Registers—*List July 1, 1903.*
Japanned, Electroplated and Bronzed *66⅔%*
White Porcelain Enamel....*60%*
Solid Brass or Bronze Metal..*25%*

Revolvers—
Single Action.....*$3¢@$1.00*
Double Action, except 44 cal.$2.00
Double Action, 44 caliber....*$2.00*
Automatic *$4.00*
Hammerless *$4.50*

Riddles, Hardware Grade
16 in.....*per doz.$2.50@$2.75*
17 in.....*per doz.$2.75@$3.00*
18 in.....*per doz.$3.00@$3.25*

Rings and Ringers—
Bull Rings—

	2	2½	3 inch.
Steel	$0.70	0.75	0.80 doz.
Copper	$1.10	1.25	1.65 doz.

Hog Rings and Ringers—
Hill's Rings, gro. boxes....*$4.25*
Hill's Ringers, Gray Iron, doz.60¢
Hill's Ringers, Malleable Iron.. *doz.80¢*
Blair's Rings.....*per gro.$*
Blair's Ringers.....*per doz.75¢*
Brown's Rings.....*per gro.$5.25*
Brown's Ringers....*per doz.75¢*

Rivets and Burrs—
Copper .....*40&10@50%*
Carriage, Coopers', Tinners, &c.:
Black .....*70&10%*
Metallic Tinned.....*70%*

Bifurcated and Tubular—
Assorted in Boxes.
Bifurcated, per doz. boxes, pasteboard boxes, 50 count, 23@25¢; Tin boxes, 100 count, 29@32¢.
Tubular, per doz. boxes, 50 count, 29@32¢; 100 count, 51@58¢.

Rollers—
Cronk's Stay, No. 50.....$1.00
Cronk's Brinkerhoff No. 55, $0.60; No. 56, $0.75; No. 60.....$0.75
Lane's Stay.....40%
Richards' Stay:
Handy Adj. and Reversible No. 53.75¢
O. K. Adj. and Reversible No. 58.50¢
Lag Screw, Nos. 53 and 57.....50%
Underwriters', Nos. 59, 60.....50%
Favorite, No. 54.....60%

Rope—
Manila, 7-16 in. diam. and larger:
Pure .....*lb., 11½@12¢*
Sisal, 7-16 in. diam. and larger:
Pure .....*lb., 8¢*
Sisal, 7-16 in. diam. and larger:
No. 2 quality.....*lb., 7@7¼¢*
Sisal, Hay, Hide and Bale Ropes, Medium and Coarse:
Mixed .....*lb., 7@7¼¢*
Pure .....*lb., 9¼¢*
Sisal, Tarred, Medium Lath Yarn, Coarse and Untarred:
Mixed .....*lb., 6¼@6¾¢*
Pure .....*lb., 7¼¢*
Cotton Rope:
Best, ¼-in. and larger...18@20¢
Medium, ¼-in. and larger.16@17¢
Common, ¼-in. and larger..10¢
In coils, ½¢ advance.
Jute Rope:
Thread, No. 1, ¼-in. & up, lb, 7½@8¢
Thread, No. 2, ¼-in. & up, lb., 7@7½¢

Wire Rope—
Galvanized .....*37½&2½%*
Plain .....*45&2½%*

Ropes, Hammock—
Covert Mfg. Co.:
Jute, 35%; Sisal.....20%

Rules
Boxwood .....*60@60&10%*
Ivory .....*35&10@35&10&5%*
Chapin-Stephens Co.:
Boxwood 60%
Flexifold 40%
Ivory .....25@25&10%
Miscellaneous .....50@50&10%
Stephens' Combination.....55%
Stationers' .....50@50&10%
Keuffel & Esser Co.:
Folding, Wood.....35&10%
Folding, Steel.....33⅓&10%
Lufkin's Steel.....50&10%
Lufkin's Lumber.....50&10%
Urson Nut Co.:
Boxwood .....60@60&10%
Ivory .....35&10@35&10&10%

Sash Balances—
See *Balance, Sash.*

Sash Locks—See *Locks, Sash.*

Sash Weights—
See *Weights, Sash.*

Sausage Stuffers or Fillers
See *Stuffers or Fillers, Sausage.*

Saw Frames—
See *Frames, Saw.*

Saw Sets—See *Sets, Saw.*

Saw Tools—See *Tools, Saw.*

Saws—

Atkins':
Circular 45%
Band ..... 50@50&10%
Butcher Saws 50%
Cross Cuts 35%
One-Man Cross Cut 40%
Narrow Cross Cut 50%
Hand, Rip and Panel ..... 35&5%
Miter Box and Compass 40%
Mulay, Mill and Drag 45%
Wood Saws ..... 40&10%
Chapin-Stephens Co.:
Turning Saws and Frames ..... 30@30&10%
Diamond Saw & Stamping Works:
Sterling Kitchen Saws ..... 30&10&10%
Disston's:
Circular, Solid and Ins'ted Tooth 50%
Band, 2 to 18 in. wide 60%
Band, ¼ to 1¼ 60%
Crosscuts 45%
Narrow Crosscuts 50%
Mulay, Mill and Drag 50%
Framed Woodsaws 25%
Woodsaw Blades 25%
Woodsaw Rods, Tinned 15%
Hand Saws, Nos. 12, 99, 9, 16, d100, D8, 120, 76, 77, 8 ..... 25%
Hand Saws, Nos. 7, 107, 107½, 3, 1, 0, 00, Combination 30%
Compass, Key Hole, &c. 25%
Butcher Saws and Blades 30%
C. E. Jennings & Co.'s:
Back Saws 16⅔%
Butcher Saws ..... 25&7½%
Compass and Key Hole Saws, 33⅓&7½%
Framed Wood Saws ..... 25&7½%
Hand Saws 12½%
Wood Saw Blades ..... 33⅓&7½%
Millers Falls:
Butcher Saws ..... 15&10%
Star Saw Blades ..... 15&10%
Massachusetts Saw Works:
Victor Kitchen Saws ..... 40&10&50%
Butcher Saws Blades ..... 35@40%
Peace & Richardson's Hand Saws 30%
Simonds':
Circular Saws 45%
Crescent Ground Cross Cut Saws 30%
One-Man Cross Cuts ..... 40&10%
Gang Mill, Mulay and Drag Saws 45%
Band Saws 50%
Back Saws ..... 25@25&7½%
Butcher Saws ..... 35@35&7½%
Hand Saws ..... 25@25&7½%
Hand Saws, Bay State Brand 45%
Compass, Key Hole, &c. ..... 25@25&7½%
Wood Saws ..... 40&7½%
Wheeler, Madden & Clemson Mfg. Co.'s Cross Cut Saws 50%

Hack Saw Blades and Frames—

Atkins' Hack Saw Blades A A A 25%
Disston's:
Concave Blades 25%
Keystone Blades 35%
Hack Saw Frames 30%
Simonds Mfg. Co 35%
C. E. Jennings & Co.'s:
Hack Saw Frames, Nos. 175, 180 ..... 40&7½%
Hack Saws, Nos. 175, 180, complete, 40&7½%
Goodell's Hack Saw Blades ..... 40&10%
Griffin's Hack Saw Frames ..... 35&5&10%
Griffin's Hack Saw Blades ..... 35&5&10%
Star Hack Saws and Blades ..... 15&10%
Sterling Hack Saw Blades ..... 30&10&5%
Sterling Hack Saw Frames ..... 30&10&10%
Sterling Power Hack Saw Machines, each, No. 1, $25.00; No. 2, $30.00 ..... 10%
Victor Hack Saw Blades 30%
Victor Hack Saw Frames 40%

Scroll—

Barnes, No. 7, $15 ..... 25%
Barnes' Scroll Saw Blades 40%
Barnes' Velocipede Power Scroll Saw, without boring attachment, $18; with boring attachment, $20 ..... 20%
Lester, complete, $10.00 ..... 15&10%
Rogers, complete, $3.50 and $4.00 ..... 15&10%

Scales—

Family, Turnbull's ..... 50@50&10%
Counter:
Hatch, Platform, ½ oz. to ¼ lbs. ..... *doz., $5.50*
Two Platforms, ½ oz. to 8 lbs. ..... *doz., $16.00*
Union Platform, Plain ..... *$1.70@1.90*
Union Platform, Stpd ..... *$1.85@2.15*
Chatillon's:
Eureka 25%
Favorite 40%
Crocers' Trip Scales 50%
The Standard Portables 40%
The Standard R. R. and Wagon ..... 50&10%

Scrapers—

Box, 1 Handle ..... *doz. $2.00@2.25*
Box, 2 Handle ..... *doz. $2.50@2.60*
Ship ... Light, $2.00; Heavy, $4.50
Chapin-Stephens Co., Box ..... 30@30&10%
Richards Mfg. Co., Foot 60%

Screws—Bench and Hand

Bench, Iron, doz., 1 in., $2.50@2.75; 1½, $3.00@3.25; 1¼ $3.50@3.75
Bench, Wood ..... 20@20&10%
Hand, Wood ..... 70&10@70&10&10%
Chapin-Stephens Co., Hand ..... 70@70&10&2½%

Coach, Lag and Hand Rail—

Lag, Cone Point ..... 75&10&10%
Coach, Gimlet Point ..... 75&10&5%
Hand Rail ..... 70&10@75%

Jack Screws—

Standard List ..... 70&10@75%
Millers Falls ..... 50&10&10%
Swett Iron Works ..... 70@75%

Machine—

Cut Thread, Iron, Brass or Bronze:
Flat Head or Round Head, 50@50&10%
Fillister Head ..... *40@40&10%*
Rolled Thread, F. H. or R. H., Iron ..... *75&10%*
F. H. or R. H., Brass, Nos. 8 to 14 ..... *65&10%*

Set and Cap—

Set (Iron) ..... *75&10&7½%*
Set (Steel), net advance over Iron *25%*
Sq. Hd. Cap ..... *70&10&7½%*
Hex. Hd. Cap ..... *70&10&7½%*
Rd. Hd. Cap ..... *50&7½%*
Fillister Hd. Cap ..... *60&7½%*

Wood—

List July 23, 1903.
Flat Head, Iron ..... *87½&5@..%*
Round Head, Iron ..... *85&5@..%*
Flat Head, Brass ..... *80&5@..%*
Round Head, Brass ..... *77½&5@..%*
Flat Head, Bronze ..... *75&5@..%*
Round Head, Bronze ..... *72½&5@..%*
Drive Screws ..... *87½&5@..%*

Scroll Saws—

See *Saws, Scroll.*

Scythes— *Per doz.*

Grass, No. 1, Plain ..... *$6.25@6.75*
Clipper, Bronzed Webb ..... *$6.50@7.00*
No. 3 Clipper, Pol'd Webb ..... *$6.75@7.25*
No. 6 Clipper and Solid Steel, $7.00@7.50
Bush, Weed and Bramble, No. 2. ..... *$6.50@7.00*
Grain, No. 1 ..... *$8.25@8.75*
Bronzed Webb, No. 1 ..... *$8.50@9.00*
Nos. 3 and 4 Clipper, Grain ..... *$8.75@9.25*
Solid Steel, No. 6 ..... *$9.25@9.75*

Seeders, Raisin—

Enterprise ..... 25@30%

Sets— Awl and Tool—

Fray's Adj. Tool Handles, Nos. 1, $12; 2, $18; 3, $12; 4, $9; 5, $6 ..... 50%
Millers Falls Adj. Tool Handles, No. 1, $12; No. 4, $12; No. 5, $18 ..... 20&10%

Garden Tool Sets—

Ft. Madison Three Plows, Hoe, Rake and Shovel ..... ℔ doz sets $9.00

Sets, Nail—

Octagon ..... *gro. $3.50@3.75*
Buck Bros 27½%
Cannon's Diamond Point, ℔ gro, $12, 40&10%
Mayhew's ..... ℔ gro. $9.00
Snell's Corrugated, Cup Pt ..... 40&10%
Snell's Knurled, Cup Pt ..... 40&10%
Victor Knurled Cup Pt ..... ℔ gro. $7.50

Rivet—

Regular list ..... *75@75&10%*

Saw—

Atkin's:
Criterion 40%
Adjustable 40%
Disston's Star, Monarch and Triumph 30%
Morrill's No. 1 ..... $15.00
Nos. 3 and 4, Cross Cut $20.60
No. 5, Mill $30.00
Nos. 10, 11, 95 ..... $15.60
No. 1 Old Style $10.00
Special $16.25
} 60%
Giant Royal Cross Cut ..... ℔ doz. $8.00
Royal, Hand ..... ℔ doz. $4.50
Taintor Positive ..... ℔ doz. $4.75

Shaving—

Fox Shaving Sets, No. 30 ..... ℔ doz., net, $24.00
Smith & Hemenway Co.'s 75%

Sharpeners, Knife—

Pike Mfg. Co.:
Fast Cut Pocket Knife Hones, ℔ doz $1.50
Mounted Kitchen Sand Stone, ℔ doz $1.50
Natural Grit Carving Knife Hones, ℔ doz $3.00
Quick Cut Emery Carving Knife Hones, ℔ doz $1.50
Quick Edge Pocket Knife Hones, ℔ doz $2.00
} 25&10%

Skate—

Smith & Hemenway Co., Eureka 50%

Shaves, Spoke—

Iron ..... *doz. $1.10@1.25*
Wood ..... *doz. $1.75@2.25*
Bailey's (Stanley R. & L. Co.) 45%
Chapin-Stephens Co ..... 30@30&10%
Goodell's, ℔ doz. $9.00 ..... 15&10%

Shears—

Cast Iron	*7*	*8*	*9 in.*	
Best	*$16.00*	*18.00*	*20.00*	*gro.*
Good	*$13.00*	*15.00*	*17.00*	*gro.*
Cheap	*$5.00*	*6.00*	*7.00*	*gro.*

Straight Trimmers, &c.:
Best quality Jap ..... *70@70&10%*
Best quality, Nickel ..... *60@60&10%*
Tailors' Shears ..... *40@40&10%*
Acme Cast Shears ..... 40@40&5%
Heinisch's Tailor's Shears 10%
Wilkinson Shear & Cutlery Co.:
Sheep, 1900 list ..... 30&10&5%
Grass ..... 50&10%
Horse or Mule ..... 50&10%

Tinners' Snips—

Steel Blades ..... *20&5@20&10%*
Steel Laid Blades ..... *40&10@50%*
Forged Handles, Steel Blades, Berlin 50%
Heinisch's Snips 40%
Jennings & Griffin Mfg. Co.'s 6½ to 10 in ..... 33⅓&7½%
Niagara Snips 40%
P. S. & W. Forged Handles, 25%:
W. R. W ..... 40&10%

Pruning Shears—

Cronk's Hand Shears 33⅓%
Cronk's Wood Handle Shears 33⅓%
Disston's Combined Pruning Hook and Saw, ℔ doz. $18.00 ..... 25%
Disston's Pruning Hook only, ℔ doz., $12.00 ..... 25%
John T. Henry Mfg. Co.:
Pruning Shears, all grades 40%
P. S. & W. Co ..... 40&10%
Columbian-Cutlery Co.:
Hedge, Wilcut Brand ..... 60&10%
Lawn and Border, Wilcut Brand. 60&10%

Sheaves— Sliding Door—

Reading 40%
R. & E. list 15%

Sliding Shutter—

Reading list 40%
R. & E. list 10%

Shells—Shells, Empty—

Brass Shells, Empty:
Climax, 10 and 12 gauge ..... 65&10%
Club, Rival, 65&5%; First Quality, 60&5%
Paper Shells, Empty:
New Rapid, 10, 12, 16 and 20 gauge, 25&10%
Climax, 10 and 12 gauge; Acme, 10, 12, 16 and 20 gauge; Ideal, 10, 12, 16 and 20 gauge; Leader grade, 25&5%
Union, League, 12 and 12 gauge; Rival Grade 25%
New Climax, Defiance, 10, 12, 14, 16 and 20 gauge; Climax, 14, 16 and 20 gauge ..... 20&5%
Challenge, Monarch, 10, 12, 16 and 20 gauge; League, Union, 14, 16 and 20 gauge; Repeater Grade 20%

Shells, Loaded—

Loaded with Black Powder *40%*
Loaded with Smokeless Powder, medium grade ..... *40&5%*
Loaded with Smokeless Powder, high grade ..... *40&10&10%*
Union Metallic Cartridge Co.:
New Club, Black Powders 40%
Nitro Club, Smokeless Powders ..... 40&5%
Arrow, Smokeless Powders ..... 40&10&10%
Winchester:
Smokeless Repeater Grade ..... 40&5%
Smokeless Leader Grade ..... 40&10&10%
Black Powder 40%

Shingles, Metal— Per Sq.

Edwards Mfg. Co.:	Painted.	Galv.
14 x 20	$4.25	$6.00
10 x 14	4.50	6.25
7 x 10	4.75	6.50

Wheeling Corrugating Co.:

Dixie, 14 x 20 in	$4.25	$5.50
Dixie, 10 x 14 in	4.50	6.00
Dixie, 7 x 10 in	5.00	6.75

Shoes, Horse, Mule, &c.—

F.o.b. Pittsburgh:
Iron ..... *per keg. $4.10*
Steel ..... *per keg. $3.85*
Burden's, all sizes ..... ℔ keg $3.90

Shot—

	25-lb. bag.
Drop, up to B	*$1.85*
Drop, B and larger	*2.10*
Buck	*2.10*
Chilled	*2.10*
Dust	*2.30*

Shovels and Spades—

Association List, Nov. 15, 1902 ..... *40%*
Avery Stamping Co 40%

Snow Shovels—

Long Handle ..... *$3.25@3.50*
Wood and Mail, D. Handle ..... *$3.75@4.00*

Sieves and Sifters—

Hunter's Imitation ..... *gro. $9.50@10.00*
Hunter's Genuine ..... *per gro. $12.00@12.50*

Sifters, Ash—

Acme Ball Bearing Sales Co., Acme Automatic Ash Sifter, each, $3.25; ℔ doz $39.00

Sieves, Seamless Metallic

	Per dozen.			
Mesh	*14*	*16*	*18*	*20*
Iron Wire	*$1.05*	*1.05*	*1.10*	*1.20*
Tinned Wire	*$1.15*	*1.15*	*1.20*	*1.30*

Sieves, Wooden Rim—

Nested, 10, 11 and 12 Inch.
Mesh 18, Nested ..... *doz. $0.90@0.95*
Mesh 20, Nested ..... *doz. $1.00@1.05*
Mesh 24, Nested ..... *doz. $1.30@1.40*

Sinks, Cast Iron—

Painted, Standard list:
12 x 12 to 22 x 36 in *60%*
20 x 40 to 24 x 50 in *50%*
24 x 60 to 24 x 120 in *30%*
Barnes' low list:
Up to and including 20 x 36 in 50%
20 x 40 to 24 x 50 in 45%

NOTE.—There is not entire uniformity in lists used by jobbers.

Skeins, Wagon—

Cast Iron ..... *70@75&10%*
Steel ..... *40@45%*

Slates, School—

Factory Shipments.
"D" Slates ..... *85@50&10%*
Eureka, Unexcelled Noiseless ..... *60&5 tens*
Victor A, Noiseless ..... *60&4 tens &5%*

Slaw Cutters—See *Cutters.*

Snaps, Harness—

German ..... *40@40&10%*
Covert Mfg. Co.:
Derby, 25%; Yankee, 30&2%; Yankee Roller, 30&2%
High Grade, 40%; Trojan 40%
Jockey 25%

Snaths—

Scythe ..... *55@60%*

Snips, Tinners—See *Shears.*

Spoons and Forks—

Silver Plated—

Good Quality ..... *50&10@60&5%*
Cheap ..... *60@60&10%*
International Silver Co.:
1847 Rogers Bros., 40&10%; Rogers & Hamilton ..... 50&10%
Rogers & Bro., William Rogers' Eagle Brand ..... 50&10%
Anchor, Rogers Brand 60%
Wm. Rogers & Son ..... 60&10%

Miscellaneous

German Silver ..... *60@60&5%*

Tinned Iron—

Teas ..... *per gro. 50¢ @ $5*
Tables ..... *per gro. $0.90@$1.00*

Springs— Door—

Bardsley's Spring and Check 40%
Chicago (Coil) ..... 40&10%
Gem (Coil) 20%
Pullman (Coil) 35%
Reliance (Coil) ..... 40&10%
Star (Coil) 30%
Torrey's Rod, 39 in ..... ℔ doz. $1.10

Carriage, Wagon, &c.—

1¼ in. and Wider:	*Per 100 lb.*
Black	*$4.75@$5.00*
Half Bright	*$4.75@$5.00*
Bright	*$5.25@$5.50*

Painted Seat Springs:
1½ x 2 x 26 ..... *per pr. 49¢ @ 52¢*
1½ x 3 x 28 ..... *per pr. 73¢ @ 77¢*

Sprinklers, Lawn—

American Foundry & Mfg. Co.:
Cactus, 65%; Japanese, 70%; National, ℔ doz $12.00
Enterprise ..... 25@30%
Philadelphia No. 1, ℔ doz. $12; No. 2, $15; No. 3, $20 ..... 30%

Squares—

Nickel plated } *List Jan. 5, 1900.*
Steel and Iron } *75&10@80%*
Rosewood Hdl. Try Square and T-Bevels ..... *60&10&10@70%*
Iron Hdl. Try Squares and T-Bevels ..... *40&10@40&10&10%*
Disston's Try Squares and Bevels, Rosewood Handle, 60&10%; Iron Stock and Bevel 15%

Squeezers, Lemon

Wood, Common, gro., No. 0, $5.25@$5.50; No. 1, $6.25@$6.50.
Wood, Porcelain Lined:
Cheap ..... *doz. $1.00*
Good Grade ..... *doz. $1.25*
Tinned Iron ..... *doz. $0.75@1.25*
Iron, Porcelain Lined ..... *doz. $1.75*

Staples—

Barbed Blind ..... *lb. 6@6½¢*
Electricians', Association list ..... *80&10&10&10%*
Fence Staples, Plain, $2.15; Galvanized *$2.45*
Poultry Netting Staples ..... *per lb. 3¼@3½¢*

Steels, Butchers'—

Dick's 30%
Foster Bros.' 30%

Steelyards— ..... 30@30&10%

Stocks and Dies—

Blacksmiths' ..... *60@50&10%*
Curtis Rev'ble Ratchet Die Stock 25%
Derby Screw Plates 25%
Green River 25%
Lightning Screw Plate 25%
Little Giant 25%
Reece's New Screw Plates 25%

Stoners, Cherry—

Enterprise ..... 25@30%

Stones—Oil, &c.

Pike Mfg. Co., 1907 list: ℔ lb
Arkansas St. No. 1, 3 to 5½ in $2.80
Arkansas St. No. 1, 5½ to 8 in $3.50
Arkansas Slips No. 1 ..... $4.00
Lily White Washita, 4 to 8 in ..... 60¢
Rosy Red Washita, 4 to 8 in ..... 60¢
Washita St., Extra, 4 to 8 in ..... 50¢
Washita St., No. 1, 4 to 8 in ..... 40¢
Washita St., No. 2, 4 to 8 in ..... 25¢
Lily White Slips ..... 90¢
Rosy Red Slips ..... 90¢
Washita Slips, Extra ..... 80¢
Washita Slips, No. 1 ..... 70¢
Washita Slips, No. 2 ..... 40¢
} 33⅓%
India Oil Stones (entire list) 33⅓%
Quickcut Emery and Corundum Oil Stone, Double Grit 40%
Quickcut Emery and Corundum Axe Stone, Double Grit 33⅓%
Quickcut Emery Rubbing Bricks 40%
Hindostan No. 1, R'g'lar, ℔ lb 8¢
Hindostan No. 1, Small, ℔ lb 10¢
Axe Stones (all kinds) 33⅓%
Turkey Oil Stones, Extra, 5 to 8 in ..... ℔ lb 80¢
Queer Creek Stones, 4 to 8 in. 20¢
Queer Creek Slips ..... 40¢
Sand Stone ..... 6¢

Scythe Stones—

Pike Mfg. Co., 1901 list:
Black Diamond S. S., ₱ gro. $12.00
Lamoille S. S., ₱ gro. $11.00
White Mountain S. S., ₱ gro. $9.00
Green Mountain S. S., ₱ gro. $6.00
Extra Indian Pond S.S., ₱ gro. $7.50
No. 1 Indian Pond S.S., ₱ gro. $7.00
No. 2 Indian Pond S.S., ₱ gro. $4.50
Leader Red End S. S., ₱ gro. $4.50
Quick Cut Emery, ₱ gro. $10.00
Pure Corundum, ₱ gro. $18.00
} 33⅓%
Crescent $7.00
Emery Scythe Rifles, 2 Coat, $8
Emery Scythe Rifles, 3 Coat, $10
Emery Scythe Rifles, 4 Coat, $12
Balance of 1904 list 33⅓%
Electro (Artificial), ₱ gro., $12.00 33⅓%
Lightning (Artificial), ₱ gro., $18.00 33⅓%

Stoppers, Bottle—

Victor Bottle Stoppers ₱ gro. $9.00

Stops—Bench—

Millers Falls 15&10%
Morrill's, ₱ doz., No. 1, $10.00 50%
Morrill's, No. 2, $12.50 50%

Door—

Chapin-Stephens Co. 50@50&10%

Plane—

Chapin-Stephens Co. 20%

Straps—Box—

Acme Embossed, case lots..20&10&10%
Cary's Universal, case lots....20&10&10%

Stretchers, Carpet—

Cast Iron, Steel Points, dos. 60@60&10%
Socket ..... doz. $1.66
Excelsior Stretcher and Tack Hammer Combined, ₱ doz. $6.00 20%

Stuffers, Sausage—

Enterprise Mfg. Co. 25@25&7½%
National Specialty Co., list Jan. 1, 1902 30&5%
P., S. & W. Co. 40&10&5%

Sweepers, Carpet—

Bissell Carpet Sweeper Co.: ₱ doz.
Superba, Crotch Mahogany $36.00
Triumph, Fancy Veneers $33.00
Parlor Queen, Fig. Rosewood $30.00
Elite, Hungarian Ash $29.00
Am. Queen, Fig. Mahogany $27.00
Ideal, Bird's-Eye Maple $25.00
Grand Rapids, Nickel, $24.00; Japan $22.00
Standard, Nickel, $22.00; Japan $20.00
Crown Jewel, Nickel, $21.00; Jap. $19.00
Crystal, Glass Top $36.00
Grand, 17 in. wide $36.00
Club, 24 in. wide $54.00
Hall, 28 in. wide $60.00

NOTE.—Rebates: 50c per dozen on three dozen lots; $1 per dozen on five-dozen lots; $2 per dozen on ten-dozen lots; $2.50 per dozen on twenty-five dozen lots.

Tacks, Finishing Nails, &c.

American Carpet Tacks 90&25%
American Cut Tacks 90&25%
Swedes' Cut Tacks 90&25%
Swedes' Upholsterers' 90&35%
Gimp Tacks 90&35%
Lace Tacks 90&35%
Trimmers' Tacks 90&25%
Looking Glass Tacks 65%
Bill Posters' and Railroad Tacks, 90&10%
Hungarian Nails 80&10%
Finishing Nails 70%
Trunk and Clout Nails 80%

NOTE.—The above prices are for Straight Weights.

Miscellaneous—

Double Pointed Tacks 90&10@90&10&10&5%
See also Nails, Wire.

Tanks, Oil and Gasoline—

Wilson & Friend Co.:

Gal.	Gasoline	Oil
30	$2.75	$3.00
60	$3.50	$4.00
120	$5.00	$5.75

Tapes, Measuring—

American Asses' Skin 50@—%
Patent Leather 25@30@5%
Steel 33 1-3@5%
Chesterman's 25@25@5%
Keuffel & Esser Co.:
Favorite, Ass Skin 40&10@50%
Favorite, Duck and Leather 25&5@25&10%
Metallic and Steel, lower list, 35@35&5%; Pocket, 35@35&5%.
Lufkin's:
Asses' Skin 40&10@50%
Metallic 30@30&5%
Patent Bend, Leather 25&5@25&10%
Pocket 40@40&5%
Steel 33⅓@35%
Wiebusch & Hilger:
Chesterman's Metallic, No. 34L, etc. 25%
Chesterman's Steel, No. 1038L, etc. 35%

Teeth, Harrow—

Steel Harrow Teeth, plain or headed, ⅝-inch and larger... per 100 lbs. $2.75@$3.00

Thermometers—

Tin Case, Cabinet, Flange, Dairy, &c. 30@33⅓%

Ties, Bale—Steel Wire—

Single Loop 80&10&5%
Monitor, Cross Head, &c. 70&2½%

Tinners' Shears, &c.—

See *Shears, Tinners', &c.*

Tinware—

Stamped, Japanned and Pieced, sold very generally at net prices.

Tire Benders, Upsetters, &c.

See *Benders and Upsetters, Tire.*

Tools—Coopers'—

L. & I. J. White 20@20&5%

Haying—

Myers' Hay Tools 45%

Miniature—

Smith & Hemenway Co.'s, Davidson, ₱ doz., Nickel Plated, $1.50; Gold Plated $2.00

Saw—

Atkins' Cross Cut Saw Tools....35&5%
Simonds' Improved 33⅓%
Simonds' Crescent 25%

Ship—

L. & I. J. White 25%

Transom Lifters—

See *Lifters, Transom.*

Traps—Fly—

Balloon, Globe or Acme, doz. $1.15@$1.25; gro. $11.50@12.00
Harper, Champion or Paragon, doz. $1.25@1.40; gro. $13.00@13.50

Game—

Imitation Oneida 75&10%
Newhouse 45@45&5%
Hawley & Norton 65%
Victor 75@75&10%
Oneida Community Jump 50%
Heetor 75@75&10%

Mouse and Rat—

Mouse, Wood, Choker, doz. holes 12¢
Mouse, Round or Square Wire, doz. 85@90¢
Marty French Rat and Mouse Traps (Genuine):
No. 1, Rat, ₱ doz., $13.25..$11.50 doz.
No. 3, Rat, ₱ doz., $6.50... $5.75 doz.
No. 3½, Rat, ₱ doz., $5.25. $4.70 doz.
No. 4, Mouse, ₱ doz., $3.85. $3.00 doz.
No. 5, Mouse, ₱ doz., $3.00. $2.25 doz.
Oneida Community:
Out o' Sight, Mouse, ₱ doz....$0.60
Out o' Sight, Rat, ₱ doz..... 1.25
Easy Set, Mouse, ₱ doz..... .35
Easy Set, Rat, ₱ doz..... 1.00
Wood Choker, Rat, ₱ doz. holes. .12
Premier Tin Choker, 5 hole, ₱ doz. traps..... .75

Trowels—

Disston Brick and Pointing... 25%
Disston Plastering 20%
Disston "Standard Brand" and Garden Trowels 30%
Kohler's Steel Garden Trowels, ₱ gro., 5 in., $4.80; 6 in., $6.00.
Never-Break Steel Garden Trowels.. ₱ gro. $6.00
Woodrough & McParlin, Plastering. 25%

Trucks, Warehouse, &c.—

B. & L. Block Co.:
New York Pattern 50&10%
Western Pattern 60&10%
Handy Trucks ₱ doz. $16.00
Grocery ₱ doz. $15.00
McKinney Trucks.....each, net $10.00
Model Stove Trucks.....₱ doz. $18.50

Tubs, Wash—

M'f'gr's list, price per gross.

No.	0	1	2	3	
Galvanized.	$67	$79	$89	$99	10%

Twine, Miscellaneous—

Flax Twine:
No. 9, ¼ and ½-lb. Balls.23@23¢
No. 12, ¼ and ½-lb. Balls.21@21¢
No. 18, ¼ and ½-lb. Balls.18@20¢
No. 24, ¼ and ½ -lb. Balls. according to quality... 17½@19½¢
No. 36, ¼ and ½-lb. Balls. 17@19¢
Chalk Line, Cotton ½-lb. Balls 28@31¢
Cotton Mops, 6, 9, 12 and 15 lb. to doz. 11@19¢
Cotton Wrapping, 5 Balls to lb., according to quality... 15½@23¢
American 2-Ply Hemp, ¼ and ½-lb. Balls. 14½@15½¢
American 3-Ply Hemp, 1-lb. Balls 15½@16½¢
India 2-Ply Hemp, ¼ and ½-lb. Balls (Spring Twine) 10½@11½¢
India 3-Ply Hemp, 1-lb. Balls 10½@11½¢
India 3-Ply Hemp, 1½-lb. Balls, 10@11¢
2, 3, 4 and 5-Ply Jute, ½-lb. Balls 13½@14½¢
Mason Line, Linen, ½-lb. Bls.47¢
No. 264 Mattress, ¼ and ½-lb. Balls, according to quality. 30@60¢
Wool, 3 to 6 ply....B 9¢; A 10¢

Vises—

Solid Box 50@50&10%

Parallel—

Athol Machine Co.:
Simpson's Adjustable 40%
Standard 40%
Amateur 25%
Columbian Hdw. Co. 40%
Fisher & Norris Double Screw, net, each, Nos. 2, $10.50; 3, $16.00; 4, $20.50; 5, $27.00.
Fulton Mach. & Vise Co.:
Reed, Swivel 25%
Star, Solid Jaw 40%
Hollands':
Machinists' 40@40&5%
Keystone 65&5@70%
Lewis Tool Co.:
Adjustable Jaw 30%
Monarch, 50%; Solid Jaw 50%
Massey Vise Co.:
Clincher 40%
Perfect, 15%; Lightning Grip 15%
Merrill's 20%
Millers Falls Oval Slide Pattern.60&10%
Parker's:
Victor, 20@25%; Regulars 20@25%
Vulcan's 40@45%
Combination Pipe 55@60%
Prentiss 20@25%
Rock Island 25%
Snediker's X. L. 33⅓%
Stephens' 33⅓%

Saw Filers—

Disston's D 3 Clamp and Guide, ₱ doz., $24.00, 30%; Clamps 30%
Perfection Saw Clamps, ₱ doz.... $4.50
Reading 60%

Wood Workers—

Fulton Mach. & Vise Co.:
Reed 25%
Star 40%
Massey Vise Co.:
Lightning Grip, 15%; Perfect 15%
Wyman & Gordon's Quick Action, 6 in., $6.00; 9 in., $7.00; 14 in., $8.00.

Miscellaneous—

Holland's Combination Pipe..60@60&5%
Massey's Quick Action Pipe 40%
Parker's Combination Pipe:
87 Series, 60%; 187 Series, 60&5%; No. 870 40%.
Rock Island Pipe 25%

Wads—*Price per M.*

B. E., 11 up 60¢
B. E., 9 and 10 70¢
B. E., 8 80¢
B. E., 7 80¢
P. E., 11 up $1.00
P. E., 9 and 10 1.25
P. E., 8 1.50
P. E., 7 1.50
} *Dis. 15%*
Ely's B. E., 11 and larger.$1.70@1.75
Ely's P. E., 12 to 20....$3.00@3.25

Ware, Hollow—Cast Iron, Hollow—

Stove Hollow Ware:
Enameled 45&10%
Ground 50&5%
Plain or Unground 60%
Country Hollow Ware, per 100 lbs. $3.00
White Enameled Ware:
Maslin Kettles 65&10%
Covered Wares:
Tinned and Turned 35&10%
Enameled 45&10%
See also *Pots, Glue.*

Enameled—

Agate Nickel Steel Ware 33⅓%
Iron Clad Ware 70&10%
Lava and Volcanic, Enameled..40&10%

Tea Kettles—

Galvanized Tea Kettles:

Inch	6	7	8	9
Each	45¢	50¢	55¢	65¢

Steel Hollow Ware—

Avery Spiders and Griddles..65@65&5%
Avery Kettles 60%
Porcelained 50&5@50&10%
Never Break Spiders and Griddles.. 65&5%
Never Break Kettles 60%
Solid Steel Spiders and Griddles.65&5%
Solid Steel Kettles 60%

Warmers, Foot—

Pike Mfg. Co., Soapstone....40@40&10%

Washboards—

Solid Zinc: ₱ doz.
Crescent, family size, bent frame.$4.05
Red Star, family size, stationary protector $4.05
Double Zinc Surface:
Saginaw Globe, family size, stationary protector $3.55
Cable Cross, family size, stationary protector $3.60
Single Zinc Surface:
Naiad, family size, open back, perforated $3.00
Single Saginaw Globe $2.85
Brass Surface:
Brass King, Single Surface, open back $4.05
Nickel Plate Surface:
No. 1001 Nickel Plate, Single Surface $3.60
Glass Surface:
Glass King, Single Surface, open back $3.95
Enamel Surface:
Enamel King, Single Surface, ventilated back $3.95

Washers—Leather, Axle—

Solid 90@90&10%
Patent 90@90&5%
Coil: ⅞ 1 1¼ 1¼ *Inch.*
11¢. 12¢. 13¢. 15¢. per box

Iron or Steel—

Size bolt.... 5-16 ⅜ ½ ⅝ ¾
Washers...$5.90 5.00 3.70 3.50 3.30
The above prices are based on $5.50 off list.
In lots less than one keg add ½¢ per lb.; 5-lb. boxes add ½¢ to list.

Cast Washers—

Over ½ inch, barrel lots..... per lb. 1¾@2¢

Wedges—

Oil Finish.....lb., ..@3¢

Weights—Hitching—

Covert Mfg. Co. 30&2%

Sash—

Per ton, f.o.b. factory:
Eastern District $30.00
Southern Territory $24.00@25.00
Western and Central Districts $25.00@28.50

Wheels, Well—

8-in., $2.22; 10-in., $2.82; 12-in., $3.36; 14-in., $4.80.

Wire and Wire Goods—

Bright and Annealed:
6 to 9 72¢10¢71½%
10 to 18 72½¢10¢10½%
19 to 26 75¢10¢10¢21½%
27 to 36 77½¢71½%
Galvanized:
6 to 9 72½¢10%
10 to 14 72½¢10¢5%
15 to 16 72½¢10¢5%
17 to 18 72½%
19 to 26 70¢5¢21½%
27 to 36 65¢10¢10%
Coppered:
6 to 9 65¢10¢10%
10 to 14 70¢10¢5%
15 to 18 65¢10¢10¢10%
19 to 26 70¢5¢21½%
27 to 36 72½¢10¢21½%
Tinned:
6 to 18 67¢10¢10%
Brass 17¼¢ *lb., base*
Copper 32¢ *lb., base*
Cast Steel Wire 50%

Spooled Wire—

Annealed and Tinned..70¢10¢10%
Brass and Copper.....60¢10¢10%
Retailers' Assortments, per box, $2.10@$2.40
Wire Clothes Line, see Lines.
Wire Picture Cord, see Cord.

Bright Wire Goods—

Steel Wire Goods.90¢20@90¢25%
Brass Wire Goods....90@90¢10%
Brass Cup and Shoulder Hooks, 80¢15%

Wire Cloth and Netting—

Galvanized Poultry Netting, 80¢5@80¢10%
Painted Screen Cloth, 100 ft., $1.30
Standard Galv. Hardware Grade: Per 100 sq. ft.
Nos 2, 2½ & 3 Mesh.....$2.50
Nos. 4 and 5 Mesh.....$2.75
No. 6 Mesh.....$3.00
No. 8 Mesh.....$3.50

Wire, Barb—See *Trade Report*

Wrenches—

Agricultural 75@75&10%
Alligator or Crocodile..70&10@75%
Baxter Pattern S Wrenches... 70&5@70&10%
Drop Forged S 45@45&5%
Acme 60&10%
Alligator Pattern, 70%; Bull Dog..70%
Bemis & Call's:
Adjustable S, 40%; Adjustable S Pipe, 40%; Briggs Pattern, 40%; Combination Bright, 40%.
Steel Handle Nut 50%
Combination Black 40&5%
Merrick Pattern 50%
Boardman's 40%
Coes' Genuine Knife Hdl..40&10&5&5%
Coes' Genuine Steel Hdl..40&10&5&5%
Coes' Genuine Key Model..40&10&5&5%
Coes', Genuine Hammer Handle..... 40&10&5&5%
Coes' "Mechanics'"...40&10&10&5&5%
Donohue's Engineer 40&10%
Eagle 70%
Gem Pocket 50%
Hercules 70%
W. & B. Machinist:
Case lots 50&5%
Less than case lots 50%
W. & B. Railroad Special:
Case lots 50%
Less than case lots 40&10&5%
Solid Handles, P., S. & W., 50&10%; full cases 50&10&5%
Stillson 65%
Uwanta Wrench Co.:
Railroad Special, Iron Handle, 40&10&5%
Other Wrenches 50%
Vulcan and Agrippa Chain 50%

Wrought Goods—

Staples, Hooks, &c., list March 17, '92 90%

Zinc—*(Cask lots at mill.)*

Sheet.....per 100 lb., $7.00

CURRENT METAL PRICES.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from store—

Refined Iron:	
1 to 1⅞ in. round and square	₩ ℔ 2.10¢
1½ to 4 in. x ⅜ to 1 in.	₩ ℔ 2.10¢
1½ to 4 in. x ¼ to 5-16	₩ ℔ 2.30¢
Rods—⅝ and 11-16 round and square	₩ ℔ 2.30¢
Angles:	Cts ₩ ℔
3 in. x ¼ in. and larger (except 3½ in. and 4 x ¼ 2.50¢)	2.40¢
3 in. x 3-16 in. and ⅛ in.	2.65¢
1½ to 2½ in. x ¼ in.	2.45¢
1½ to 2¾ in. x 3-16 in. and thicker	2.40¢
1 to 1¼ in. x 3-16 in.	2.45¢
1 to 1¼ x ⅛ in.	2.50¢
⅞ x ⅛ in.	2.65¢
¾ x ⅛ in.	2.75¢
⅝ x ⅛ in.	3.80¢
½ x 3-32 in.	4.30¢
Tees:	
1 in.	2.75¢
1¼ in.	2.55¢
1½ to 2½ in.	2.45¢
3 in. and larger	2.50¢
Beams	2.40¢
Channels, 3 in. and larger	2.40¢
Bands—1½ to 6 x 3-16 to No. 8	2.45¢
"Burden's Best" Iron, base price	3.30¢
Burden's "H. B. & S." Iron, base price	3.10¢
"Ulster"	3.10¢
Norway Bars	3.60¢
Norway Shapes	3.80¢

Merchant Steel from Store—

	per ℔
Bessemer Machinery	2.10¢
Toe Calk, Tire and Sleigh Shoe	2.50@3.00¢
Best Cast Steel, base price in small lots	7¢

Sheets from Store—

Black

	One Pass, C.R. Soft Steel.	R. G. Cleaned.
No. 14	₩ ℔ 2.95	3.00¢
Nos. 18 to 21	₩ ℔ 3.05	3.10¢
No. 27	₩ ℔ 3.20	3.50¢
No. 28	₩ ℔ 3.30	3.60¢

Russia, Planished, &c.

Genuine Russia, according to assortment, W. Deweeswood	₩ ℔ 11¾@14½¢
Patent Planished	₩ ℔ A, 10¢; B, 9¢, net.

Galvanized.

Nos. 14 to 16	₩ ℔, 3.35¢
Nos. 22 to 24	₩ ℔, 3.75¢
No. 27	₩ ℔, 4.20¢
No. 28	₩ ℔, 4.45¢

No. 20 and lighter 36 inches wide, 25¢ higher.

Tin Plates—

American Charcoal Plates (per box.)

A.A.A. Charcoal:	
IC, 14 x 20	$6.60
IX, 14 x 20	7.85
A. Charcoal:	
IC, 14 x 20	$5.65
IX, 14 x 20	6.75

American Coke Plates—Bessemer-

IC, 14 x 20	108 ℔	$4.65
IX, 14 x 20		5.65

American Terne Plates—

IC, 20 x 28 with an 8 lb. coating	$9 00
IX, 20 x 28 with an 8 lb. coating	11.00

Seamless Brass Tubes—

List December 4, 1905. Base price 20 ¢

Brass Tubes, Iron Pipe Sizes—

List December 4, 1905. Base price 20¢

Copper Tubes—

List December 4, 1905. Base price 23¢

Brazed Brass Tubes—

List June 6, 1898. 22¾¢ ₩ ℔

High Brass Rods—

16¼¢ ₩ ℔

Roll and Sheet Brass—

List June 6, 1898. 16¼¢ ₩ ℔

METALS—

Tin—

Straits Pig ₩ ℔ 29 @30 ¢

Copper—

Lake Ingot	₩ ℔ 15 @15¼¢
Electrolytic	₩ ℔ 14¾@15¼¢
Casting	₩ ℔ 14½@15 ¢
Sheet Copper Hot Rolled, 16 oz	₩ ℔ 18@..¢
" " " 14 "	" " 19@..¢

Sheet Copper Cold Rolled, 1¢ ₩ ℔ advance over Hot Rolled.
Sheet Copper Polished 20 in. wide and under, 1¢ advance over Cold Rolled.
Sheet Copper Polished over 20 in. wide, 2¢ advance over Cold Rolled.
Bottoms, Pits and Flats ₩ ℔ 23¢ basis
Planished Copper, 1¢ ₩ ℔ more than Polished.

Spelter—

Western ₩ ℔ 5¼@6 ¢

Zinc.

No. 9, base, casks, ₩ ℔ 7.50¢ | Open ₩ ℔ 8.00¢

Lead.

American Pig	₩ ℔ 4½@5 ¢
Bar	₩ ℔ 5½@6 ¢

Solder.

½ & ½, guaranteed	₩ ℔ 21 @21¾¢
No. 1	₩ ℔ 19 @19¾¢
Refined	₩ ℔ 17 @17½¢

Prices of Solder indicated by private brand vary according to composition.

Antimony—

Cookson	₩ ℔ ..@13¢
Halletts	@12¢
Other Brands	@11¢

Aluminum—

No. 1 Aluminum (guaranteed over 99% pure), in ingot for remelting:

Small lots	nominal
100-℔ lots	nominal

Old Metals.

Dealers' Purchasing Prices Paid in New York

	Cents
Copper, Heavy and Wire	₩ ℔ 11.00@11.25¢
Copper, Light and Bottoms	₩ ℔ 10.00@10.50¢
Brass, Heavy	₩ ℔ 8.00@ 8.50¢
Heavy Machine Composition	₩ ℔ 10.50@11.00¢
Clean Brass Turnings	₩ ℔ 6.50@ 7.00¢
Composition Turnings	₩ ℔ 8.00@ 9.00¢
Lead, Heavy	₩ ℔ ...@ 3.50¢
Tea Lead	₩ ℔ ...@ 3.20¢
Zinc Scrap	₩ ℔ ...@ 3.25¢
No. 1 Yard Wrought, Long	$ 8.50@ 9.00
No. 1 Yard Wrought, Short	$ 8.00@ 8.50
Wrought Pipe	$ 6.50@ 7.25
No. 1 Machinery Cast	$10.50@11.50
Stove Plate	$ 9.50@10.00

THE IRON AGE

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